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INDEX TO CONTENTS

Ageing Experiments on Vulcanized Rubber.. 395
Holidays Throughout the World..... 399
Hevea Brasiliensis in the Philippines..... 400
Demand for Rubber Goods..... 402
Gorton Tire Mold Machine..... 402
Calendering Vulcanite Bases for Solid Tires..... 403
Rubber Factory Hazards to be Discussed..... 405
Miller Business for 1919..... 405
Akron Tire Production Increases..... 406
Goodrich to Increase Capital..... 406
New Crude Rubber Firm..... 406
Tire Advance in Near Future..... 407
Syracuse Completes Plant..... 408
Southern Firm to Enlarge..... 408
Washington Tire Increases..... 408
Recent Firestone Promotions..... 409
Promotions at Goodyear..... 409
Philippine Rubber Land Opened..... 410
Firestone's Canadian Plant..... 410
MARKETS:
Manufactured Rubber Goods..... 411
Cottons, Yarns and Fabrics..... 411
Chemicals and Compounding Materials..... 412
Crude Rubber 413
Scrap Rubber 413
American Rubber Patents..... 414

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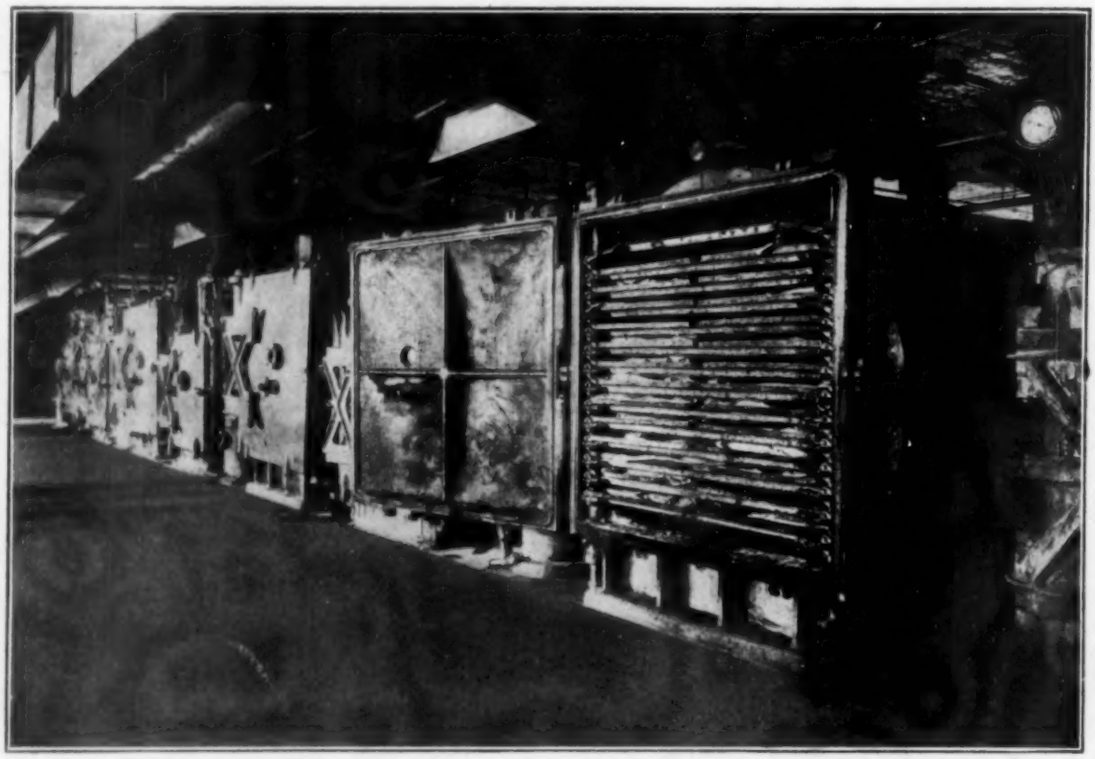

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Ageing Experiments on Vulcanized Rubber*

By Capt. B. J. Eaton, F.I.C., and F. W. F. Day

The results contained in this article are derived from preliminary investigations carried out to ascertain the changes which take place in vulcanized rubber on storing, i.e., the phenomena connected with ageing.

As a guide to a systematic examination of such phenomena it was considered advisable in the first instance to experiment on samples of rubber which had been considerably over-vulcanized, since the changes would be emphasized in such samples and would be accelerated. For the preliminary investigations, four samples of rubber were selected, Ref. Nos. 244 A 7, A 8, C 9, and C 10. (NOTE.—A 7 denotes sample A cured for 7 hours at 140° C., C 9 denotes sample C cured at a similar temperature for 9 hours, etc.)

Samples of "slab" rubber (i.e., coagulum matured for at least six days before machining to crepe) (244 A) and crepe rubber (244 C) were selected for the tests; the samples were prepared under comparable conditions and mixings containing 10 per cent of sulphur and 90 per cent of rubber were prepared as usual.

In the experiments to be described here, two sets of samples were investigated, viz., crumbed (i.e., ground to coarse particles) and original test pieces or unerumbed specimens. The object of breaking up samples into coarse particles was to accelerate any changes which might take place due to atmospheric influence, since such changes would be affected by the amount of exposed surface of the rubber. The crumbed samples were stored in specimen tubes loosely packed and closed with a nickel cap. The amount of combined sulphur was determined at intervals with the results shown in Table I.

In addition to the results given in this table, which show actual decrease in combined sulphur content with ageing, the combined sulphur content of another crumbed sample, viz.: 244 A 24 (i.e., cured for 24 hours) was found to have dropped from 10.0 per cent to 8.8 per cent during one month's storage, while an unerumbed sample 244 A 9 dropped during a period of six months from 10.0 per cent to 9.0 per cent.

It was discovered, however, that no useful deductions could be drawn from these figures owing to the remarkable increase in weight which occurred in the crumbed samples after storage, i.e., on ageing. Unfortunately these large increases in weight had not been followed up in these preliminary experiments. The following results, however (see Table II), are instructive and indicate also that much over-cured samples would give even greater increases over similar periods.

TABLE I.

	Boiling water extraction.				Subsequent acetone extraction.				
Ref. No. 244	Extract (by difference). %	Residue. %	Soluble sulphate and H_2SO_4 (as sulphur). %	Total acidity, H_2SO_4 (as sulphur). %	Extract (by difference). %	Residue. %	Soluble sulphur. %	Combined sulphur (by combustion). %	Total sulphur. %
A 7	26.2	73.8	0.92	2.08	19.6	80.4	Aq. 0.92 Ac. 1.37	4.13	6.42
A 8	22.9	77.1	0.94	2.11	22.3	77.7	Aq. 0.94 Ac. 1.36	4.32	6.62
C 9	3.4	96.6	0.75	1.69	36.8	63.2	Aq. 0.75 Ac. 1.43	5.06	7.24

Aq. = Aqueous extract. Ac. = Acetone extract.

In this experiment 2-grm. samples of crumbed rubber 244 A 1¾ and 244 B 2¼, were left in watch-glasses and weighed at intervals.

From these results it would appear that the maximum increase in weight is reached in about nine months. Before proceeding to a more detailed investigation of ageing phenomena, it was considered desirable to examine the nine months' old crumbed samples, of which details are given in Table I. Samples 244 A 7, A 8, and C 9 were investigated, with the results shown in Table III.

As it was practically certain that the increases in weight were due to oxidation, it was thought probable that sustances soluble in water might be present, and to test this, the samples were extracted with boiling water and the percentage of extract (by difference), the percentage of sulphur in the form of sulphate or sulphuric acid in the aqueous extract, and the total acidity of the extract as sulphuric acid were determined as sulphur. The extraction with water was followed by extraction with acetone in order to obtain the free sulphur content and the additional matter extractable by acetone.

It will be seen from the above results that a remarkable percentage of matter extractable by water has been formed

TABLE II.

Date—1916-1917.	244 A 1¾ (over-cured slab) Weight. Grms.	Increase. %	244 B 2¼ (under-cured sheet) Weight. Grms.	Increase. %
December 21	2.00	0.0	2.00	0.0
January 19	2.01	0.5	2.01	0.5
February 8	2.05	2.5	2.02	1.0
May 5	2.30	15.0	2.07	3.5
July 26	2.48	24.0	2.13	6.5
September 5	2.59	29.5	2.18	9.0
November 2	2.56	28.0	2.18	9.0

TABLE III.

Ref. No.	Unerumbed sample. Total sulphur.	Crumbed samples. Original total sulphur.	Combined sulphur after storing for Nil.	2.3 mos.	5.4 mos.	8.4 mos.
244 A 7	10.17	10.10	9.56	4.81	3.74	4.13
A 8	10.26	10.06	9.82	4.55	3.92	4.32
C 9	9.86	10.00	9.48	5.33	4.63	5.06
C 10	10.06	10.01	9.63	6.47	4.76	...
Mean	10.09	10.04	...	...	...	...

NOTE.—Complete sulphur analyses and tensile properties of these samples were published in this Journal, 1917, 36, 18.

*Journal of the Society of Chemical Industries.

during the ageing of the very over-cured samples 244 A 7 and A 8 and a smaller quantity in the less over-cured sample 244 C 9. The amount of sulphur present as sulphates in the aqueous extract is also marked. Further, the acetone extract contains substances other than the sulphur and the resin which would be present in the original raw rubber (which ordinarily amounts to 2.3 per cent). Here again, however, no further deductions can be drawn from the results, since the increases in weight of the above samples, after the period of storage, had not been determined. It will be seen later that some of these increases are in the neighborhood of 40 per cent, which would bring the total sulphur content of the samples, calculated on original weight, up to about 9 per cent, which still indicates an actual loss of sulphur on ageing.

TABLE IV.

Percentage increase in weight in ageing samples of crumbed vulcanized rubber, Ref. No. 358 S_2.

No. 1. Tube-stored.
No. 2. Watchglass stored.
No. 3. Disc samples on watchglasses.

	A 9			A 3			A 1¼			A ½			B 9			B 6			B 2¾			B 2		
	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
1917																								
Oct. 11	0.0	0.0	..	0.0	0.0	..	0.0	0.0	..	0.0	0.0	..	0.0	0.0	..	0.0	0.0	..	0.0	0.0	..	0.0	0.0	..
" 17	0.3	0.3	..	0.1	0.2	..	0.0	0.2	..	0.0	0.1	..	0.2	0.4	..	0.1	0.1	..	0.0	0.1	..	0.0	0.0	..
" 25	2.8	3.3	..	0.3	0.4	..	..	0.2	..	..	..	..	1.2	2.4	..	0.4	0.5	..	..	..	..	0.1	..	..
Nov. 1	8.4	14.0	..	0.7	1.3	..	..	..	..	..	..	..	3.9	8.9	..	0.7	2.2	..	0.04	..	..	..	..	..
" 10	13.5	14.1	Nil	..	..	Nil	..	..	Nil	..	..	Nil	7.3	9.1	Nil	..	..	Nil	..	..	Nil	..	..	Nil
" 12	14.3	14.4	0.1	1.8	1.5	0.1	0.05	0.2	..	Nil	0.1	..	7.9	9.7	..	1.8	2.5	..	0.05	0.1	..	0.1	0.0	..
" 22	17.4	16.7	..	4.2	4.2	..	0.06	0.2	..	..	..	..	11.0	12.6	..	3.6	4.4	..	..	..	..	..	..	..
Dec. 10	20.4	18.6	0.4	13.0	13.8	0.4	0.1	0.2	..	..	..	..	15.2	15.5	0.2	7.5	8.4	0.3	..	..	..	..	..	..
" 17	21.3	19.3	..	16.3	16.9	..	0.2	0.2	..	..	..	..	16.4	16.6	..	9.5	10.4	..	..	..	..	..	..	..
" 24	22.1	19.7	..	19.2	18.6	..	0.2	0.2	..	..	..	..	17.3	17.0	..	11.6	12.3	..	..	..	..	..	..	..
1918																								
Jan. 3	23.7	20.5	0.6	22.7	20.6	0.6	0.3	0.2	..	0.05	0.2	..	18.5	17.6	0.3	15.2	14.9	0.5	0.2	0.3	..	0.2	0.2	..
" 16	25.2	20.6	..	26.2	21.4	..	0.3	0.3	..	..	0.2	..	19.6	18.0	..	18.8	16.8	..	0.3	0.3	..	..	0.2	..
" 30	26.6	20.7	0.6	29.7	21.8	0.8	0.3	0.3	0.1	0.1	0.2	..	20.7	18.0	0.4	21.5	17.8	0.6	0.3	0.6	..	0.2	0.2	..
Feb. 21	28.3	20.6	0.5	33.7	22.0	0.9	0.5	0.3	0.1	0.1	..	..	21.8	18.1	0.3	24.1	18.4	..	0.4	0.7	..	0.2	0.2	Nil
Mar. 8	32.0	22.2	0.7	36.7	24.3	1.2	0.9	1.1	0.3	0.2	0.2	0.1	24.2	19.5	..	28.8	21.3	0.8	0.6	1.5	0.1	0.3	0.9	0.1
May 21	36.4	23.6	0.7	38.3	26.9	1.3	1.5	2.2	0.3	0.3	0.5	0.1	26.8	20.5	0.5	33.7	22.9	0.8	1.0	2.5	0.2	0.4	1.1	0.1
June 11	37.6	23.6	0.7	38.7	27.4	1.3	2.0	2.8	0.3	0.3	0.6	0.1	28.6	20.9	0.6	35.6	23.1	0.9	1.3	3.0	0.2	0.5	1.1	0.1
July 24	39.4	25.0	0.8	39.4	29.8	1.4	3.6	6.0	0.5	0.5	0.7	0.2	31.7	22.0	0.7	37.7	24.0	1.1	2.2	4.7	0.4	0.7	1.6	0.2

Present Investigation

Scheme of Experiment.—As a result of the preliminary experiments given above it was decided to trace the changes, due to ageing, in the combined sulphur content, and the aqueous and acetone extracts, after making allowances for the oxidation or other changes in weight. For this purpose, two sets of about 10 grms. of crumbed rubbers were stored in specimen tubes as before. The first set was used to provide samples for analysis at different periods, while the second set was weighed at intervals, but not otherwise disturbed. (Before analysis the contents of the tube were thoroughly mixed.) In addition, 2-grm. samples of each crumbed rubber were left on watch-glasses and also weighed at intervals, as it was thought that ageing (as indicated by increase in weight) would proceed more rapidly in the case of crumbs exposed to the air and under different conditions from those packed in closed tubes. Further, 8-grm. discs about 5 mm. thick and 44 mm. in diameter were also exposed in small basins. The basins were used in order to retain any sulphur exuding on the surface due to the well-known "blooming" of vulcanized rubber.

For this experiment the following samples were selected:—Ref. No. 358 S_2—A ¼, A ½, A 3 and A 9; 358 S_2—B 2, B 2¾, B 6 and B 9. The figures given after the letters indicate the period of vulcanization in hours given to the sample (thus 358 S_2 A ¼ represents sample 358 S_2 A cured for ¼ hour). The samples 358 S_2 A (optimum time of cure indicated by tensile curve = 1⅓ hours; vide Bulletin No. 27, "The preparation and vulcanization of plantation Para rubber," published by the Agricultural Department, F. M. S., 1918, and previous papers in this Journal) were derived from "slab" rubber, and the samples 358 S_2 B were from ordinary crepe samples from the same bulked latex. The coagulant was acetic acid (1 : 1066 on the latex). The latex was diluted to contain approximately 1.5 lb. of dry rubber per gallon.

Table IV.—Columns 1, 2 and 3 give the percentage increases in weight, in the case of crumbed samples stored in tubes, crumbed samples stored in watch-glasses, and disc samples stored in small basins respectively. In the case of the disc samples, weighings were made also in the case of samples A 1, A 1½, A 6, B 2, B 2½, B 2¾, B 3 and B 3¼, but the figures are not produced, in order to save space, since they gave values intermediate, as expected, for the intermediate cures.

These increases in weight were plotted as graphs, as shown in diagrams 1 (slab) and 1A (crepe) which illustrate the relative changes of weight very clearly.

Reference to these diagrams shows that, during the first ten days a slow increase in weight takes place in all the samples, after which period the factors favoring a rapid increase are (*a*) over-curing of the rubber, (*b*) freedom from complete exposure to the air. The most rapid increase is shown by the

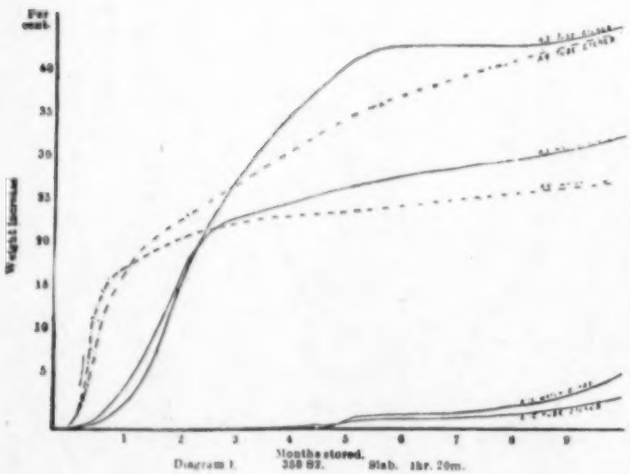


Diagram 1. 358 S2. Slab. 1hr. 20m.

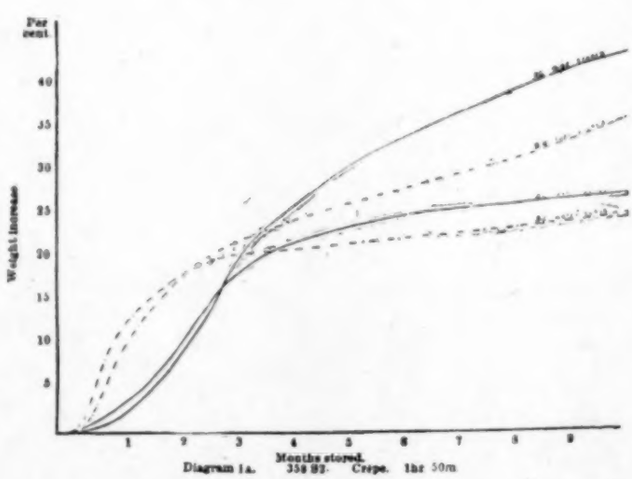


Diagram 1a. 358 S2. Crepe. 1hr 50m

most over-cured sample (A 9) when exposed on a watch-glass.

A similar relationship holds good between the tube-stored and watchglass-stored samples for each pair of samples, the greatest difference between pairs occurring in the case of B 9 and the least in the case of A 3. In every instance, however, the increases in weight of the tube-stored samples overtake those of the watchglass-stored samples after priods varying from one to two and one-half months, the period increasing according as the initial increase or slope of the curve is less steep, i.e., according as the over-curing of the sample is less; i.e., a slightly over-cured sample does not reach this point till the later period. Thus, the curves for A 9 intersect after thirty-six days, B 9 after sixty-six days, A 3 after sixty-eight days, and B 6 after eighty-one days.

The type of curve for each pair, up to the point of intersection, appears to be more or less constant and the difference between the A and B curves is very slight, as is apparent by comparing the two diagrams. Excessive over-curing appears to be the principal factor affecting the type of curve, the curves for the very over-cured samples, A 9 and B 9, being all convex to the ordinate, while the A 3 and B 6 curves are both concave. After the point of intersection is reached each pair of curves continues to diverge at a slope greater than that of their original incidence. Anomalies now begin to occur. Sample A 3 (tube-stored) diverges quickly, by maintaining its upward slope, while the remainder begin slowly and progressively to flatten out, i.e., tend to become horizontal and parallel to the abscissa. At the end of five and one-half months the graph of A 3 (tube-stored) has become almost flat, a stage which is not reached by the remaining tube-stored samples till nearly twelve months.

Different Result Obtained

In the case of watch-glass-stored samples a quite different result is obtained, the graphs of these samples tending to become horizontal after about four months and to show every tendency to keep below the tube-stored samples for an indefinite period.

It seems clear that the explanation lies in the fact that while increases in weight are proceeding uniformly in both sets of samples, a loss of weight is proceeding *pari passu* in the freely exposed samples, which leads to an apparent retarded increase. It has already been shown (Table III) that there is an actual loss of total sulphur, and further experiments, to be described, place the fact beyond doubt that the ageing of rubber involves very complex changes, which have not yet received investigation. Among these changes is the ascertained fact that the percentage of sulphur in the over-cured rubbers, after decreasing for some months, subsequently increases, which may be regarded as conclusive of complex change.

Of the four samples investigated it is a noteworthy fact that sample A 3 has given the greatest increases in weight (in the case of watch-glass, tube-stored, and disc samples) in spite of the fact that sample A 9 has been given three times as long a cure. Over-curing beyond a certain point therefore ceases to increase the capacity of a rubber to gain weight during storage, after the early ageing period is passed, and in view of the fact that sample B 6 presents a similar case with reference to sample B 9, it can be assumed that such excessive over-curing does actually decrease the capacity of ageing as measured by weight increase.

Combined Sulphur Content

These samples were also stored and periodically analyzed for combined sulphur content by the method already described in a previous article.

The results of these analyses are given in Table V and the graphs, which are given in Diagram II, illustrate even more clearly the extraordinary rise in sulphur content which takes place after six-nine months, thus confirming the work carried out during 1916-1917 already referred to in this paper.

Only the much over-cured crumbed samples show combined sulphur content changes on ageing. Normally cured samples do not show much variation in this respect, although some changes can be traced. These changes are, however, small and irregular.

It will be noted from the remarks at the foot of Table V that conclusive evidence of the loss of sulphur as volatile sulphide was obtained accidentally in the case of the acetone-extracted residues of sample B 6, although, in the case of the other samples, such loss was not observed. It was noticed generally that the color changes of the samples of stored crumbs which took place were greatest in those portions of the samples in contact with the sides of the tubes, i.e., the portions exposed to light. The central portion or core of the tube-stored crumbs appeared to be unaffected in the under-cured samples; the over-cured samples, however, broke down to a powder. Probably therefore, if given sufficient time, the full ageing effects (i.e., 40 per cent increase in weight) would develop in all the samples.

On examining the curves of the two very over-cured samples A 9 and B 9 in Diagram II a minimum sulphur content is found after rather more than one month, i.e., at about the period of intersection of the curves for weight increase (Diagram I). The sulphur content changes in sample A 3 are small compared to those in samples A 9 and B 9, and it would appear therefore that the large variations of weight in the case of sample A 3 are not closely correlated to the variations in sulphur content or alternatively that the correlation is obscured by other factors. It is evident that very complex changes are proceeding in which the loss of sulphur compounds at one time exceeds, proportionately, the loss of other constituents; it is also clear that at a later stage the conditions are reversed, leading to an increase in sulphur content. Further, throughout the whole period of change a steady gain in weight, due presumably to oxidation, is taking place.

The crumbed samples, after various ageing periods, were treated for six-eight hours in a Soxhlet apparatus with boiling water, followed, after drying, by acetone extraction, with the results shown in Table VI.

Some idea of the changes in the portions soluble in water and in acetone can be obtained, but close analysis of the results is impossible, owing to the weight increases, and it is not possible to eliminate the effect of these changes. Fresh crumbs

TABLE V.

Direct acetone extractions.

(Sulphur percentages worked back to original crumbed weights before ageing.)

358 S_2	October 11, 1917. Combined.	Soluble.	Total.	Group average:	October 27, 1917. Combined.	Soluble.	Total.	Group average:	November 10, 1917. Combined.	Soluble.	Total.	Group average:	November 22, 1917. Combined (aver.).	Soluble.	Total.	January 5, 1918. Combined. (aver.).	Soluble.	Total.	June 18, 1918. Combined (aver.)	Soluble (apportioned)	Total.	Group average:
A 9	9.80	0.09			[illegible]	[illegible]			4.95*	3.58	8.53		4.60[2]	5.14	9.74	5.83[2]	3.87	9.70	5.41[2]	3.33		
A 3	7.97	1.92			7.99	1.96			...	...	...		7.80[4]	1.93	9.73	7.94[2]	2.64	10.58	6.35[2]	2.39		
A 1¼	4.42	5.47			...	...			...	...	...		...	...	...	...	...	...	4.26[2]	5.74		
A ½	2.40	7.49			...	...			...	...	...		...	...	...	...	...	...	2.23[2]	7.77		
B 9	10.00	0.00		9.80	9.21	0.74		9.95	7.14	2.93	10.07		6.30[4]	3.49	9.79	6.33[2]	3.45	9.78	6.00[2]	2.74		9.37
B 6	8.08	1.81			8.12	1.83			...	...	...		7.80[2]	1.89	9.69	7.89[2]	2.30	10.19	6.15[2]	2.59		
B 2¾	3.83	6.06			...	...			...	...	...		...	...	...	...	...	...	4.10	5.90		
B 2	2.60	7.29			...	...			...	...	...		...	...	...	...	...	...	2.96[2]	7.04		

(*a*) Percentages in heavy type are actual estimations; others are "difference" estimations.

(*b*) Small numbers thus—4.60[2] indicate the number of estimations from which average was obtained.

(*c*) Difference between individual analyses is less than 0.2% except in case of June 18, B 6 (5.92 and 6.38. Av. = 6.15)

(*d*) The acetone extracted residue of 22/11/17. B 6 when stored in glass stoppered weighing bottle (lead glass) deposited a metallic film (PbS) on the ground portions of the glass. The other samples did not show this peculiarity. Throughout sample B 6 has given irregular figures.

* This figure is obviously wrong; the figure for soluble, namely, 3.58, is correct.

contained no water-soluble acid or sulphur, and only a trace of any water-soluble constituent.

After about one month the two very over-cured samples began to develop a water-soluble acidity, but even the total aqueous extract was well under 2 per cent; after a period of

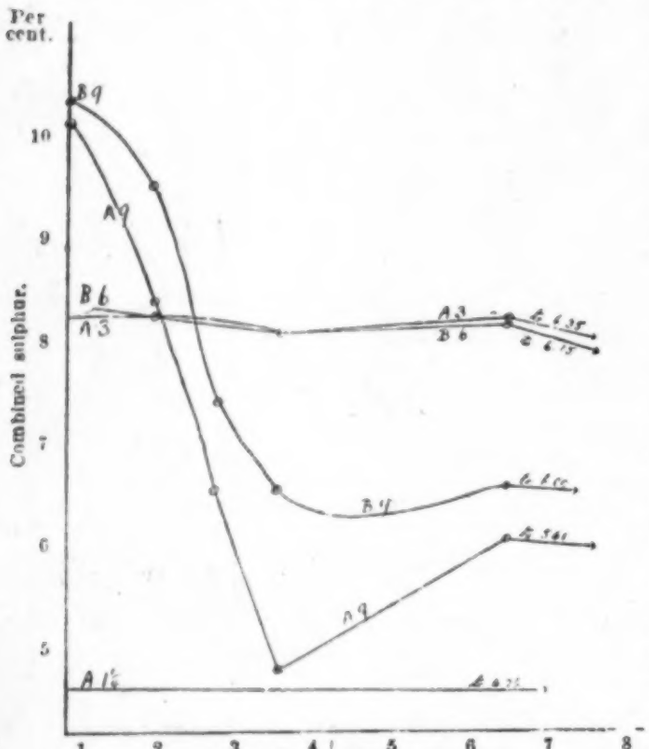


Diagram II. Combined sulphur.

nine months, however, the water-soluble extract rose to 25 per cent and the acidity to 2.5-3 per cent, calculated as sulphur, and the actual sulphur washed out to about 0.5 per cent. Contrary to what might have been anticipated, samples A 9 and B 9 gave smaller extracts than samples A 3 and B 6. The acetone extract is very large in the case of samples A 9 and B 9, while the under-cured samples show much smaller figures; after nine months the acetone extract of sample A 9 decreases, an irregularity which is correlated with the rise in combined sulphur content. These results show that complex changes are occurring, which it is not possible to examine more closely at this stage of our work.

On referring to Table III it will be seen that the nine months old sample of the crumbed crepe rubber (244 C 9) showed only 3.4 per cent of water-soluble extract, compared with 17.8 per cent for a similarly cured crepe sample (358 S_2 B 9) in the present experiments. Other factors are therefore involved which at present lack explanation.

Further experiments were carried out on two types of mixings, using samples of slab and crepe rubbers. One mixing contained the usual percentage of sulphur employed in nearly all of our vulcanization experiments, viz., 10 per cent calculated on the rubber-sulphur mixing, and the other contained 4.75 per cent of sulphur calculated on the rubber-sulphur mixing.

10 per cent Mixing Ref. No. 333 A (slab) and 333 B (crepe).

4.75 per cent Mixing Ref. No. 333 A^1 (slab) and 333 B^1 (crepe).

The tensile curves (continuous lines), as obtained on the Schopper-Dalen rubber testing machine, are shown in Diagram III and IIIA, respectively, and the combined sulphur content figures calculated on the mixing in all cases, as in previous samples, are given in Table VII.

The samples were again tested mechanically after fourteen months and tensile curves for the repeated tests are shown in Diagrams III and IIIA. No good purpose is shown by giving the figures, the changes being more clearly illustrated by the curves. It will be observed in the case of the 10 per cent sulphur samples, that the shift of the curve is equivalent to about an additional three-quarter-hour cure and, in the case of the 4.75 per cent sulphur samples, the shift is equivalent to a two hours' extra cure. In the latter case, however, it should be noted that a large increase of curing gives only a small shift of the curve.

On examining Table VII it will be observed that there is an increase in combined sulphur content in nearly every case, after storing the samples for fourteen months, but the increase is not as great as is indicated by the shift in the tensile curves, assuming the new curves had been obtained from freshly cured samples. The increases are generally greater for the more over-cured samples, although, when the combined content approximates to the total sulphur content, it is obvious that such increases cannot be great. In these experiments ageing effects were accelerated by crumbing the vulcanized specimens, so that any changes occurring in the rubber during the period of experiment would probably be comparable with those which

TABLE VI.

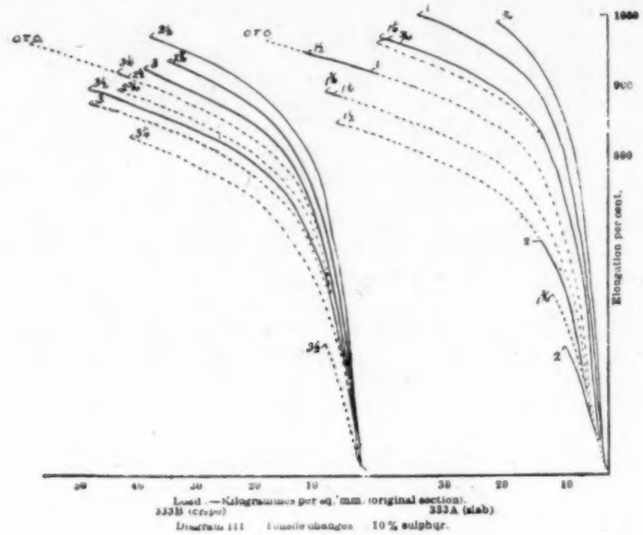
Ref. no.	Boiling water extraction: Extract (by difference)	Boiling water extraction: Residue	Boiling water extraction: Sulphur derived from extract as: Total acidity as H_2SO_4	Boiling water extraction: Sulphur derived from extract as: Total sulphur by fusion	Subsequent acetone extraction: Extract (by difference)	Subsequent acetone extraction: Residue	Direct acetone extraction: Extract (by difference)	Direct acetone extraction: Residue	Direct acetone extraction: Sulphur obtained from extract as: Total acidity as H_2SO_4	Direct acetone extraction: Sulphur obtained from extract as: Total sulphur by fusion	Date of commencing extraction
	%	%	%	%	%	%	%	%	%	%	
All samples	.....	.....	less than 0.02	.....	.....	.....	.....	.....	.....	.....	11.10.17
A 9	.....	.....	less than 0.02	.....	.....	.....	.....	.....	.....	.....	4.11.17
B 9							53.6	46.4	.....	3.58	10.11.17
A 9	.....	.....	.....	.....	.....	.....	28.0	72.0	.....	2.93	
B 9	.....	.....	.....	.....	.....	.....	57.3	42.7	.....	5.14	
A 9	1.8	98.2	0.29	0.14	24.3	75.7*	38.8	61.2	.....	3.49	22.11.17
B 9	1.6	98.4	0.29	0.14	16.5	83.5*	12.5	87.5	.....	1.89	
B 6	.....	101.3	0.06	0.16	12.6	87.4*	12.6	87.4	.....	1.93	
A 3	.....	.....	less than 0.02	.....	.....	.....					
							43.5	56.5	.....	3.87	
A 9	.....	.....	.....	.....	.....	.....	40.5	59.5	.....	3.45	
B 9	.....	.....	.....	.....	.....	.....	25.0	75.0	.....	2.30	5.1.18
B 6	.....	.....	.....	.....	.....	.....	27.5	72.5	.....	2.64	
A 3	.....	.....	.....	.....	.....	.....	.....	.....	.....	3.33	
A 9	23.4	76.6	2.68	0.45	.....	.....	.....	.....	.....	2.74	
B 9	17.8	82.2	2.21	0.39	.....	.....	.....	.....	.....	2.59	18.6.18
B 6	21.9	78.1	2.56	0.63	.....	.....	.....	.....	.....	2.59	
A 3	26.7	73.3	3.03	0.66	.....	.....	.....	.....	.....	2.39	

*These three figures rose to 76.2, 84.3 and 91.9 respectively after keeping for six weeks.

NOTE.—All percentages worked on actual weight of aged crumb taken.

would occur over a much longer period under normal conditions.

In this connection it is interesting to recall the statement made by de Vries that "the percentage of combined sulphur is quite independent of the state of cure expressed by the position of the stress-strain curves and that it is possible to bring the rubber to the 'correct' or any other chosen standard cure (as judged by the curve) with other and quite arbitrary coefficients of vulcanization. He subjected a much under-cured rubber (2.85 per cent of combined sulphur) to a temperature of 70° C. for 11 × 6 hours without affecting the sulphur content while affecting to a marked extent the mechanical properties of the vulcanized rubber, as indicated by the tensile curve. The results given above, which were carried out at normal temperature (about 30° C.), may be of a different order. The increases in combined sulphur content found by us, while small, can, in view of the method of estimation employed, be accepted as definite. It is possible that other methods of estimation have failed to detect such small but important increases. The results, however, show that the changes occurring in vulcanized samples on storage are complex and, from several points of view, require further investigation which must necessarily be prolonged.



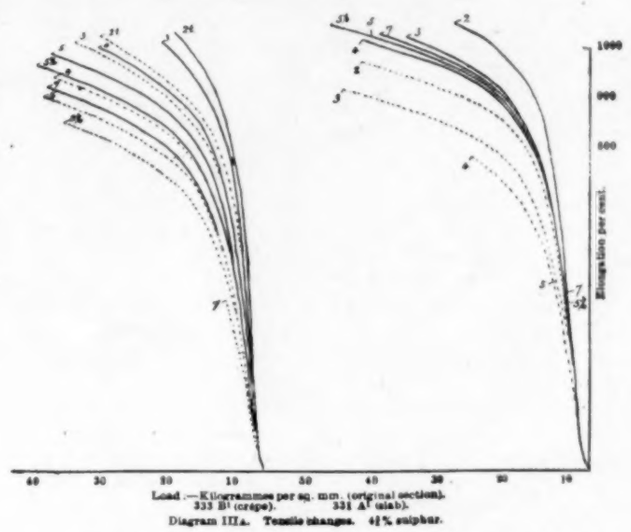


TABLE VII
Combined sulphur, %

	Ref. no. 333.	June, 1917.	July, 1918.	Increase.
A	¾	2.81	3.04	0.23
	1	3.19	3.34	0.15
	1¼	3.83	4.16	0.33
	1½	4.46	4.66	0.20
	1¾	5.30	5.62	0.32
	2	5.69	6.14	0.45
B	2½	2.72	3.04	0.32
	2¾	2.83	3.20	0.37
	3	3.14	3.36	0.22
	3¼	3.53	4.20	0.67
	3½	3.83	4.40	0.57
A¹	2	3.22	3.52	0.30
	3	4.20	4.46	0.26
	4	4.29	4.68	0.39
	5	4.84	4.82	—
	7	4.87	4.72	—
B¹	2½	1.54	1.92	0.38
	3	1.81	2.12	0.31
	4	2.54	2.80	0.26
	5	2.89	3.16	0.27
	7	3.97	4.26	0.29

Conclusions

At the present stage of these investigations, which had unfortunately to be interrupted at this point, it is not possible to draw any very definite conclusions, since the changes taking place in vulcanized rubber on ageing are obviously complex. It is considered desirable, however, to place the results on record as the literature on this subject does not appear to contain any results similar to those shown here, in respect of (1) the large increases in weight on storage, (2) the formation of a large aqueous extract in the samples, (3) the conversion of the sulphur to a large extent into aqueous soluble compounds.

NOTE: This work was carried out and completed to this stage while the authors were working together in the chemical laboratories of the Department of Agriculture, Federated Malay States.

Holidays Throughout the World

To lessen the great inconvenience which unexpected bank and public holidays throughout foreign countries and in some parts of the United States bring to American business men, the Guaranty Trust Company of New York has just issued a new edition for 1920 of its book, "Bank and Public Holidays Throughout the World."

Vanishing monarchies and inchoate republics have added to the difficulties of compiling this latest edition, but in general the book covers all the holidays in all parts of the world from New Year's Day, which is almost universal, to Tuesday, February 3, which is a holiday in Paraguay, and Tuesday, August 3, observed only in Newfoundland.

Particularly helpful to business men and bankers who must make payments and collections in foreign countries, or in distant parts of the United States, the two previous editions of this book have won it a wide utility. For instant reference, it is divided into two parts, the first a daily calendar for 1920, indicating under each day in just which countries a holiday is being observed. For example, under Wednesday, June 23, are listed the Bahamas, the Leeward Islands, Mauritius, Sweden (where it is only a half-holiday) and Western Australia.

The second part lists all the countries and political subdivisions by name, giving under each the dates and names of all holidays celebrated there during the year. June 23 in Mauritius, for example, is the Prince of Wales' birthday; whereas in Sweden it is Midsummer's Eve. Each way of listing the holidays has its particular value. Thus an export house dealing with all countries would find the general calendar of greatest help. A house dealing only with the Argentine would find the second part more convenient.

Hevea Brasiliensis in the Phillipines

By Harry S. Yates

(From the Botanical Section of the Biological Laboratory, Bureau of Science, Manila)

Probably no agricultural industry within the Tropics has undergone so remarkable a development during the past twenty years as has the plantation-rubber industry. *Hevea brasiliensis*, the principal source of plantation rubber, was first grown under cultivation when it was introduced into Ceylon about 1877. Very little further planting was done until the experimental stage was passed and seed became available in quantity. The beginning of the cultivation of *Hevea* in Ceylon may be said to date from about 1890 to 1895, though for the first ten years development was comparatively slow. In Malaya *Hevea* attracted very little attention until about 1897, when, coffee becoming less profitable, planters saw the need of some product to supplement or replace it. The cultivation of *Hevea* having proved successful and profitable in Ceylon and Malaya, many plantations have been started in other countries, more especially in Sumatra, Java, Borneo, India, Burma, Cochin China, New Guinea, and other places in the Asiatic Tropics, the Gold Coast and elsewhere in Africa, and in various parts of tropical America.

Little Rubber Grown in American Territory

Although the United States takes considerably more than one-half of the world's supply of crude rubber, very little is produced in American territory. In view of the very large importation of rubber into the United States and the importance of the industries there dependent upon it, it would seem very desirable to develop a rubber-planting industry within American territory should land and climatic conditions suitable for the successful growth of *Hevea brasiliensis* be found.

There has long been a question as to the suitability of certain sections of the Philippines for the growth of *Hevea brasiliensis*, but notwithstanding its remarkable development in nearby countries the industry has received very little attention in the islands. However, a small area of *Hevea brasiliensis* has been planted and is now producing rubber in profitable quantities; and, while it must be admitted that the industry has hardly passed the experimental stage, it has been demonstrated that rubber will grow and yield satisfactory returns in the Philippine Islands.

The original home of *Hevea brasiliensis* is in tropical South America, along the Amazon and its tributaries, a region having a moist, warm climate and a fairly uniform distribution of rainfall. Meteorological data from the observatory at Belem (Para), located near the coast and slightly south of the mouth of the Amazon, indicate a climate with a rainfall averaging about 2,500 millimeters, fairly evenly distributed throughout the year, though with a dryer season during September, October and November. The temperature appears to be fairly uniform during the year; it averages about 25° C., and rarely falls below 20° C. or rises above 37° C.

Agreeable Conditions Essential

When a plant is introduced into new regions, it will usually be found to succeed best where the climate approaches that of its original habitat; and this rule has been found to apply to Para rubber. The successful growth of *Hevea* is not strictly limited to regions where conditions are precisely similar to those prevailing in the Amazon Valley; yet it certainly finds its optimum habitat in regions at comparatively low elevations, possessing a climate with a rainfall not much below 2,000 millimeters, evenly distributed throughout the year, and with a temperature rarely, if ever, falling much below 19° or 20° C., at least for any extended period. The humidity should also be fairly high. Such a climate is found only over limited areas within a few degrees on either side of the equator.

[a] Philippine Journal of Commerce.

The amount and distribution of rainfall in the southern part of the Philippine Archipelago appears to be quite suitable for *Hevea brasiliensis*.

During the period from 1903 to 1913 the average rainfall at Isabela, Basilan Island, was 1,794.1 millimeters, with a minimum occurring in 1905 of 1,103 millimeters. During this time there were but three months entirely without rain, though there is a dryer season during January, February and March. The number of rainy days during the period under consideration has averaged 153.1, with a minimum of 112 in 1905.

In the following table are given the average rainfall and the number of rainy days at a number of other stations in the southern part of the Philippines.

RAINFALL DATA FOR THE SOUTHERN PHILIPPINE ISLANDS, 1903-1913.

[Rainfall is given in millimeters.]

	Jolo.		Davao.		Cotabato.		Zamboanga.	
Month.	Rainfall.	Rainy days.	Rainfall.	Rainy days.	Rainfall.	Rainy days.	Rainfall.	Rainy days.
January.	89.1	7.4	110.2	5.9	98.8	12.6	37.2	4.9
February.	122.4	7.4	141.6	7.5	88.8	10.1	62.0	5.1
March ..	85.2	8.1	164.2	7.5	68.1	7.8	21.0	2.5
April ...	118.2	7.3	190.3	9.2	164.9	12.7	38.2	5.5
May	160.2	13.5	252.8	11.6	218.5	14.7	72.0	7.6
June ...	203.3	15.0	234.2	11.0	237.3	17.2	88.8	10.6
July	172.0	12.2	208.9	10.2	292.0	18.4	99.0	10.6
August .	170.4	13.9	207.4	10.1	271.8	18.4	95.0	10.9
Sept'mb'r	184.4	12.5	203.6	9.8	248.6	16.7	106.3	9.5
October .	222.9	16.1	242.3	11.6	255.1	15.3	116.1	10.1
Novemb'r	193.0	14.5	176.4	9.2	231.7	15.9	106.5	9.4
December	144.8	14.4	208.8	10.1	133.5	13.0	84.3	8.1
Total	1,865.9	142.3	2,340.7	113.7	2,309.1	172.8	926.4	94.8

The rainfall at Zamboanga is the lightest recorded for any station in the Philippines, and is given here solely for the purpose of showing the variation in rainfall that may occur within a comparatively short distance. Zamboanga is separated from Basilan by a strait but a few kilometers wide. In a range of hills only a few kilometers back of Zamboanga the rainfall is again much heavier. Davao has the heaviest and most evenly distributed rainfall of any of the stations listed. Cotabato is, however, a very close second.

Rainfall in the East

Rainfall data from various localities in the East where Para rubber is being successfully grown are compiled in the following table:

AVERAGE RAINFALL IN RUBBER-PRODUCING DISTRICTS OF THE ORIENT.

[Rainfall is given in millimeters.]

	Ceylon, 1905-1908.[a]	Malaya.					Borneo, 1910-1913.[b]	
Month.	Peradeniya.	Henaratgoda.	Kuala Lumpur, F. M. S. 1915-16.[b]	Singapore. 1914-16.[c]	Penang. 1914-16.[c]	Sandakan.	Jesselton.
January.	67.0	47.8	74.9	322.3	50.0	301.2	106.9
February	66.5	95.8	53.3	88.3	80.8	249.7	72.9
March .	100.0	125.5	201.6	228.1	237.5	137.2	45.7
April ..	137.4	220.7	297.4	253.7	212.3	117.5	133.1
May ...	133.1	304.8	136.7	132.5	316.5	126.5	209.8
June ...	241.3	234.6	170.9	163.3	251.2	114.8	307.1
July ...	211.8	111.2	228.2	211.8	302.8	154.4	209.0
August .	122.9	74.4	237.9	157.5	224.5	212.3	249.4
Septe'ber	168.1	123.9	133.7	148.0	354.1	364.5	353.1
October.	374.4	449.6	188.3	149.9	458.2	227.8	436.4
Nove'ber	173.7	361.7	193.2	252.2	305.6	292.6	280.2
Decemb'r	131.0	65.5	167.3	237.0	152.1	364.5	139.2
Total	1,927.2	2,215.5	2,083.4	2,344.6	2,945.6	2,663.0	2,542.8

[a] Report of the director, Royal Bot. Gardens of Ceylon (1906-1909).
[b] Supplement to the Official Gazette, F. M. S. Selanger Administrative report (1916-1917).
[c] The Gardens' Bulletin, Straits Settlements (1914-1916).
[d] Manual of Statistics of British North Borneo (1915).

Hevea brasiliensis appears to reach its best development in regions having a comparatively high and uniform temperature throughout the year. At Belem (Para), near the mouth of the Amazon and about 1° south latitude, the minimum temperature recorded during a period of three years was 20.2° C., and the maximum, 36.6° C.; the average yearly maximum for this

period was 32.04° C., and the average yearly minimum, 22.23° C.

In the Philippines the lowest temperature recorded during a period of three years (1913-1915) at Davao was 19.0° C.; at Cotabato, 19.2° C., and at Jolo, 20.2° C. During this period the maximum temperature at Davao was 36.0° C.; at Cotabato, 36.0° C., and at Jolo, 33.4° C. In general the temperature in the Mindanao region appears to range between about 20° and 34° C., and is fairly uniform throughout the year, except for a somewhat warmer period during February, March and April, when the temperature occasionally reaches 36° or 37° C.

Good Drainage Necessary

Hevea brasiliensis does not appear to be exacting in the quality or kind of soil necessary for its successful growth. Generally speaking, Para rubber may be said to do well on any soil that will support a heavy forest growth, provided drainage is good. *Hevea brasiliensis* is rather intolerant of excess of water in the soil, and very wet soils should be drained in order to obtain the best results. Heavy clay soil is not so suitable for the growth of rubber as are loamy or even sandy soils.

Philippine soils in general are good and contain ample quantities of the inorganic compounds necessary for plant growth. There are undoubtedly very large areas in the Mindanao region where the soils are suitable for the successful growth of *Hevea brasiliensis*.

Hevea brasiliensis appears to make its most rapid growth at low elevations. Though it has been grown in Ceylon and elsewhere at elevations up to 600 meters or more, the rate of growth is apparently much less rapid. It is probable that the retardative effect of altitude upon rubber is related to the lower temperatures prevailing at higher elevations. The extreme retarding effect of high elevations on the growth of trees in the Tropics is shown by the dwarfed condition of vegetation on mountain-tops in these regions.

It appears from the preceding discussion that climatic and soil conditions in the Mindanao region of the Philippine Islands compare well with those in regions in the eastern Tropics where plantation rubber is now being successfully produced. It remains to compare actual measurements of growth and yield of rubber of trees growing in the Philippines with those in other rubber-producing districts.

In Fig. 1 is plotted the average circumference of trees of the various ages measured, and from this curve the average circumference of trees from 1 to 10 years old has been calculated.

Yield Is Satisfactory

The yield obtained from Para rubber trees now being tapped in the Philippines is very satisfactory and seems to compare well with that obtained in other countries from trees of the same ages. The rubber obtained in 1916 from 20,510 trees in tapping by the end of the year was 14,991 kilograms (32,982 pounds), or an average of 0.73 kilogram (1.6 pounds) per tree. Almost 6,000 of these trees came into tapping during 1916 and 11,000 in 1915. The oldest trees were between 8 and 9 years of age at that time. Unfortunately no separate record has been kept of the yield from trees of different ages, and this renders difficult a comparison with the yields obtained in other countries.

Records of yields from one estate in the Federated Malay States indicate that trees 6 years old produced 215.5 kilograms per hectare (192 pounds per acre); trees 8 years old, a yield of 288.5 kilograms per hectare (257 pounds per acre), and trees 9 years old, 401.9 kilograms per hectare (358 pounds per acre). This yield may be compared with that at Basilan for trees (most of them only 4 to 6 years old) which, assuming there were 331 trees per hectare (134 per acre), amounts to about 241 kilograms per hectare (215 pounds per acre).

Carruthers reports that in 1907 the average yield of dry rubber over the entire Malay Peninsula amounted to 0.79 kilogram (1 pound, 12 ounces) per tapped tree, and in Selangor 0.65 kilogram (1 pound, 7 ounces) per tapped tree. The average yield obtained in Malaya in 1907 compares perhaps most closely with the yields obtained in Basilan of any records available, since in both cases the trees were young and a very high percentage of the total number was tapped for the first time.

Johnson gives records of the yield obtained on a number of Ceylon and Malayan estates. The average of yields from fourteen estates in 1905 was 0.61 kilogram (1.35 pounds) per tree. The total number of trees considered was 80,272. The greatest yield recorded was 1.47 kilograms (3.25 pounds) per tree, but that was for only 100 trees. The greatest yield for a large

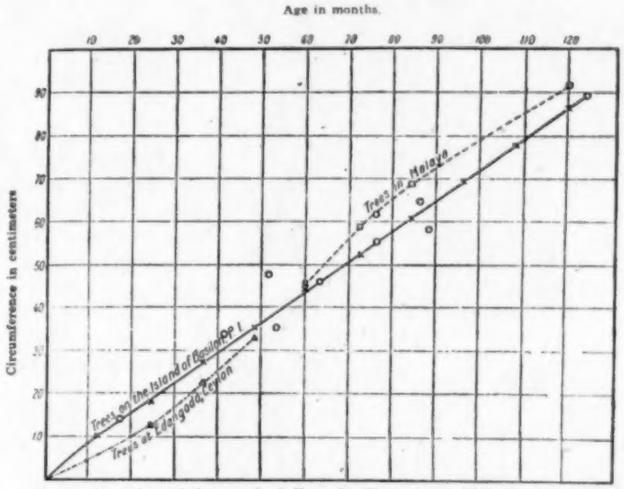


FIG. 1. Comparison of the growth of *Hevea brasiliensis* in the Philippine Islands with that in Ceylon and Malaya.

number of trees was 1.32 kilograms (3 pounds) per tree for 10,000 trees. The average of the yields from twenty-two estates in 1906 was 0.67 kilogram (1.47 pounds). The greatest yield recorded was 3.23 kilograms (7.11 pounds) per tree for 807 trees. The average of yields from eighteen estates in 1907 was 0.83 kilogram (1.83 pounds) per tree. The highest yield was 1.49 kilograms (3.28 pounds) per tree for 68,236 trees.

A discussion of the records of yields obtained from Para rubber could be continued indefinitely, but it is believed that sufficient data have been presented to show that the yield obtained from *Hevea* on Basilan compares favorably with that obtained from young trees in Malaya and Ceylon.

1. A comparison of rainfall, temperature and soil conditions obtaining in the southern part of the Philippine Archipelago with those in countries where Para rubber is successfully cultivated indicates the suitability of the former region for *Hevea brasiliensis*.

2. Measurements of *Hevea brasiliensis* at present growing in the Philippines show a rate of growth comparing favorably with records of the growth of *Hevea* in Ceylon and Malaya.

3. Yields obtained from Para rubber trees now being tapped are satisfactory and compare well with those obtained in Ceylon and Malaya.

A Treatise on Federal Taxes

With more than 135 pages of detailed explanation, the full text of the law itself, and a ten-page index, the new booklet on "Federal Taxes on Income and Profits" just issued by the Guaranty Trust Company of New York discusses the most important questions which may be raised by an individual, a partnership, or a corporation, in connection with federal income taxation.

Part One of this booklet takes up the question of the imposition of the tax, and its rates; Part Two deals with the determination of "net income"; Part Three with returns, payments and claims; Part Four solely with the excess profits tax; Part Five gives the text of the law itself.

Demand for Rubber Goods

That the demand for American-made rubber goods is increasing steadily in all parts of the world is recognized as a well-established fact. The following short resume of imports and exports of rubber goods, which were taken from the commerce reports of the Bureau of Foreign and Domestic Commerce, of the Department of Commerce, may prove enlightening as to the actual needs of some foreign countries as well as the nature and extent of the business in rubber goods enjoyed by those countries.

A short item relating to Italy's imports and exports of rubber goods follows:

Italy's trade in rubber and rubber manufactures in 1913 amounted to $11,543,217 in imports and to $9,861,147 in exports. Of the former amount, imports of crude rubber accounted for $4,940,549 and of tires for $4,393,742. Tires were the largest item of exports, being valued at $7,927,379. The imports in 1917 were valued at $17,523,941, raw rubber accounting for $13,008,046, and tires for $2,130,257. Exports for that year were valued at $6,541,938, tires, the chief item, amounting to $4,829,323, and raw rubber to $299,787. In 1918 the value of the imports increased to $19,805,933—raw rubber being valued at $16,019,097, and tires at $1,050,885—and the exports decreased to $3,150,291—tires being valued at $2,090,248.

The Italian trade in rubber, gutta-percha, and manufactures thereof is very small, the normal consumption within the country being about 2,000 tons per year outside of imported rubber overshoes. Practically all the raw material brought in is used by one company whose name is almost synonymous with rubber tires. Several other firms, however, manufacture rubber goods. Exports of tires have exceeded imports for some years, being, in 1913, 3,012 tons; in 1914, 4,114 tons; in 1915, 4,361 tons; in 1916, 3,778 tons; in 1917, 2,117 tons; and in 1918, 916 tons. Of the 1913 exports, which can be taken as representing normal conditions, 888 tons went to Belgium, 587 to Switzerland, 403 to Great Britain, 352 to Germany, 270 to Austria-Hungary, 134 to Argentina, 97 to France, and 64 tons to Australia. The largest customers for Italian rubber goods outside of tires, particularly for small tubes and elastic, were Argentina, Brazil, Cuba, and Uruguay, which, with other Latin American countries, probably took two-thirds of all exports. Most owners of good automobiles prefer imported tires, which they consider superior to those of Italian manufacture. The market is not, however, extensive, as the number of cars is small.

The importation of rubber overshoes, which particularly interests American manufacturers, who have had control of this market for many years, shows a decided tendency to decrease.

(*Continued on page* 404)

Gorton Tire Mold Machine

The George Gorton Machine Co., of Racine, Wis., is manufacturing an improved machine known as the No. 1—M Tire Mold Machine shown in Fig. 1. This is suited to the cutting of treads on drums 48 in. in diameter and less, any width or face. It handles molds or rings for milling on the inside 44 in. and less. The mold is clamped together and engraved for the center line following which each half is engraved separately. A quick indexing arrangement is on each machine so that no time is lost and this is of such a nature that it is next to impossible for a boy to index wrong, as index drums are used for the correct number of holes, so that by no possibility can the design be cut excepting in some predetermined location, according to the number of divisions.

Figure 2 shows the No. 1—H size machine for engraving on either concave or convex surfaces used for placing lettering on the sides of molds. The machine is 4 ft. 6 inches high and the maximum diameter of work which may be swung between supports while resting on the table is 53 inches. This machine is furnished either with a motor drive to be attached to the ceiling or a direct connected self-contained motor drive.

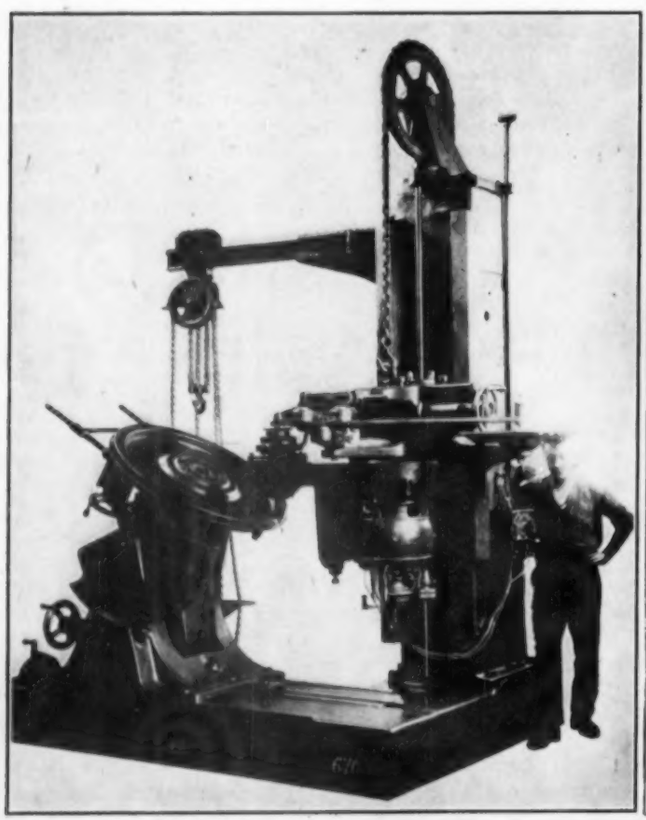


FIG. 1 TIRE MOLD MACHINE

FIG. 2 ENGRAVING MACHINE

Calendering Vulcanite Bases for Solid Tires

The subject of this invention is machines for calendering rubber strips and machines for calendering strips which form the vulcanite bases for solid rubber tires, such machines being generally known as calenders.

Usually the vulcanite bases for solid rubber tires are made by cutting the rubber or vulcanite as it leaves the calender rolls into strips of the required width, which strips are simultaneously batched up or wound into roll form on to a single roller at one or each side of the calender or on to a number of narrow rollers mounted on a common shaft. Owing to the time required for putting in empty rollers and removing them when the strips have been wound the operation of the calender is intermittent and the output is therefore restricted; one object of the present invention is to enable the operation of calendering to be continuously carried out, and to enable each strip to be batched up into roll form ready for placing on the metal foundation bands of the tires. A further object is to prevent the lining or separating material, which is wound between the convolutions of the rubber or vulcanite strip during the "batching up" operation, from creasing and rendering the calender surface of the rubber or vulcanite strip uneven owing to the creases in the lining material leaving impressions in the strip.

Independent or separate batching-up rollers are provided on to which the cut strips or rubber or vulcanite are wound as they leave the calender rolls, the rollers being so arranged that any one or more of them may be removed and replaced without stopping the operation of the calender. The batching-up rollers may be detachably mounted in specially constructed tipping or rocking frames at both sides of the calender and alternate strips are wound on to the batching-up rollers at one side, whilst the intervening strips are wound on to the batching-up rollers at the other side, thereby providing sufficient space between adjacent strips to prevent them sticking together. The lining or separating material for each rubber strip is supported in spool form in the frame of each batching-up roller and during the winding or batching up of each rubber strip, the lining material is also unwound from its spool and wound on to its respective batching-up roller between the convolutions of the rubber strip. Each lining strip is passed over or around suitable rollers or pins and may be controlled by a spring or weight which places it under tension and enables it to be evenly wound between the convolutions of the rubber strip so as to prevent creases being formed and impressions being made in the rubber strip. The knives for cutting the sheets of rubber into strips are adjustable for enabling various widths of strips to be cut and the batching-up rollers are also adjustable so that they can be set into positions to suit the widths of strips to be cut.

A represents the calender frame, and A1, A2, A3 indicate the three calender rolls. As shown in Fig. 2 the rubber is fed between the rolls A3, A2, from whence it passes round the rolls, A2, A1, as indicated.

B, B are the cutting knives, which may be of circular or any other suitable shape, and are supported at the inner ends of levers B1, which may be pivoted in brackets B2, as shown in Fig. 1, slidably disposed upon a rod B3 (or as shown in Fig. 2 the knives may be directly provided on a rod B3) which rod is disposed paralleled with the calender rolls and near to the position where the rubber C passes between the middle and lower calender rolls A1 and A2 respectively. The knives may be maintained in position to engage with and cut the rubber C at points C1 on the middle calender roll A2 by weights suspended from the outer ends of the levers B1. The rubber after being cut leaves the point of nip between the middle and lower calender rolls in the form of paralleled strips C1. Alternate strips C1 pass around and under the lower calender roll A1 to the batching-up rollers D on one side (say the front) of the calender rolls and the intervening strips pass from the point of nip to similar batching-up rollers at the other or rear side of the machine (see Fig. 2). The batching-up rollers and parts appertaining to them at the rear side of the machine are not illustrated in Fig. 1, and are only indicated in outline in Fig. 2; the following description of those at the front side of the calender rolls will apply to those which are arranged at the rear side. The frames supporting the batching-up rollers D each comprise two sup-

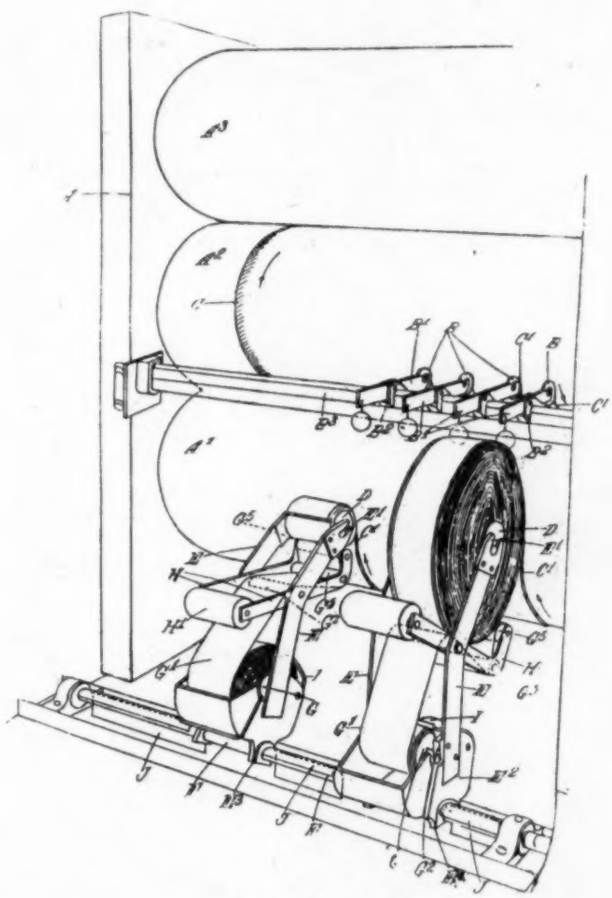


FIG. 1

ports, E, which are forked or bifurcated at their upper ends E1 and the batching-up rollers D can be readily placed in the forked ends E1 of the supports E or removed. The lower parts of the supports E are secured to or form part of a base E2, which is slidable along a rod F so that the various frames of the batching-up rollers can be adjusted either individually or collectively in accordance with the position of the cutting knives B. The frames of the batching-up rollers are independent of each other, and each is capable of rocking on the rod F to enable the supports E to assume an operative or inoperative position. The lining strip G1 to be wound between the convolutions of each rubber strip is supported in roll or spool form on a roller G, which is detachably mounted in slots G2 in the base E2 of each suporting frame E, the lining strip G1 being adapted to be passed between the supports E, and around suitable pins or rollers such as G3, G4 and G5 (at the front side of the calender rolls) prior to reaching the batching-up roller D; at the rear side of the machine the lining strip G1 only passes round two pins or

rollers, G3, G5, the pins or rollers over or round which the lining strip G1 travels are mounted in a weighted lever frame H, which serves as a guide for the lining strip G, and enables it to be evenly laid on the batching-up roller.

When it is desired to wind one of the rubber strips C1 on to a batching-up roller D the end of the said strip C1 and the lining strip G1 are secured to the batching-up roller as indicated at D1, and the supports E are moved or rocked on the said fod F so that the batching-up roller rests against the lower calender roll A1 and thus receives rotary motion with the results that the strip C1 and the lining strip G1 are wound

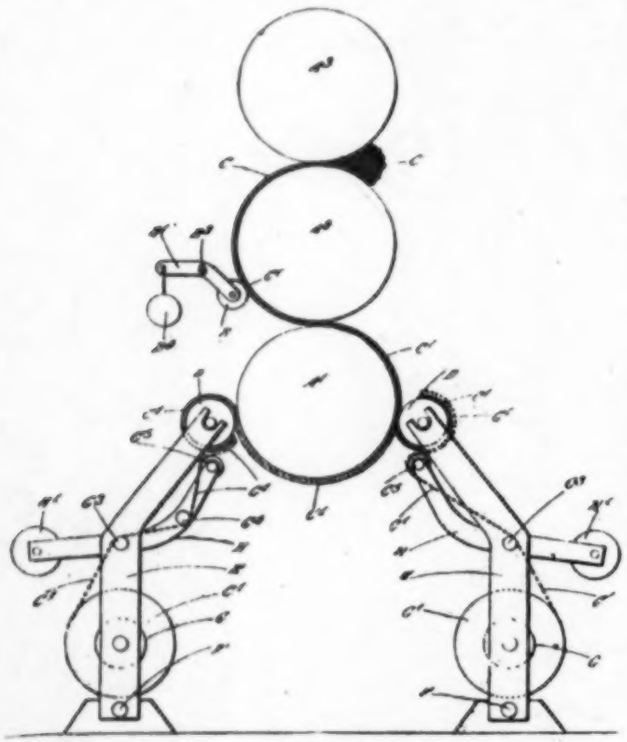


FIG. 2

on to the batching-up roller. During the winding of the strips C1 and G1 and the consequent increase in diameter of the roll or spool so formed the supporting frame carrying the batching-up roller is caused to angularly move on its rod F in a direction away from the calender roll until the strip C1 and the lining strip G1 are fully wound on to the roller D when the supporting frame carrying the batching-up roller can be angularly moved on the rod F out of contract with the calender roll into an inoperative position and retained by a suitable stop or abutment E3 on the nase E2 bearing against a suitable part of the calender frame. The fully loaded batching-up roller can then be readily removed and the rubber strip C1 wound on it ready for application to the solid tire foundation band, after the removal of a fully loaded batching-up roller.

According to one method of obtaining continuous calendering, the batching-up rollers on each side of the calender are successively placed against the lower calender roller A1, so that the winding of the strips is successively commenced; consequently in batching-up rollers become fully loaded in succession. The first fully loaded roller is removed and replaced by an empty roller to enable the strip emerging from the calender roll to be batched up. The next fully leaded roller is removed and replaced by an empty one, and so on, with the result that the removal and replacement of the batching-up rollers can be effected without stopping the calendering operation; thus the apparatus may be kept running at an even speed continuously. The weighted lever from H may be pivoted on the supports E and the lining strip G1 first passes over the roller G3 which is co-axial with the pivots of the lever frame H, then under the roller G4 at the end of the lever frame H adjacent to the batching-up roller, and then over the roller G5 which is maintained in contact with the batching-up roller or the rubber strip C1 by the weight H1 at the other end of the lever frame H. In the case of the batching-up rollers at the rear of the calender where the relation of travel of the calender roll A1 to the batching-up roller is reversed, the lining strip G1 is passed from the roller G3 direct to the roller G5, and then under and around the batching-up roller so as to be wound between the convolutions of the strip C1. The weighted lever frame H in either case ensures accurate placing of the lining strip G1 during the batching winding up of the vulcanite strip and a friction brake or spring I may bear on each roll of the lining strip G1 as it unwinds, thereby causing a drag on the strip and maintaining it under proper tension. Adjacent to and between the bases E2 of the frames carrying the batching-up rollers, distance pieces J in the form of bars or plates are supported on the rod F, the end of the said bars or plates constituting stops against which the said frames abut. Similar distance pieces may be provided on the rod B3 between and adjacent to the brackets B2 carrying the supporting knives B or the knives themselves, see Fig. 2. Various lengths of distance pieces may be readily placed between or adjacent to the frames carrying the batching-up rollers and between or adjacent to the knives, according to the desired width of rubber strip which is to be cut and batched up.

Although the invention has been described in connection with the calendering of rubber strips, it will be understood that the means set forth may be used for cutting material of any kind into strips and winding or batching-up the strips on to separate and independent rollers.

Demand for Rubber Goods

(*Continued from page* 402)

Imports in 1908 amounted to 135,856 pairs; in 1909, to 159,-168; in 1910, to 173,747; in 1911, to 201,824; in 1912, to 121,-565; and in 1913, to 43,588 pairs. The present fashion of women wearing high-heeled slippers or low shoes for street wear in winter makes the use of rubber overshoes, except sandals, impracticable. Efforts should be made to encourage the trade in an overshoe designed for such wear.

Within the last few months there has been a marked demand fof rubber footwear in Scotland. The following comment is made in regard to this:

There is a very active demand for rubber footwear in Scotland, stocks of which have been reduced to a minimum as a result of war conditions, says the Weekly Bulletin of the Canadian Department of Trade and Commerce. The principal demand, the journal states, is for ordinary goloshes and storm goloshes of broad-toed shapes, for hip boots and top boots, both leather and rubber soled, for gray canvas gymnasium shoes, and for light sand shoes. Snow boots are in little demand, and there is said to be no call for strap sandal or low-cut rubbers, for pointed shapes, or for white or brown goods.

Even the Far East has experienced an increased demand for rubber goods. The following treats of conditions in the kingdom of Siam:

Rubber goods are not manufactured in Siam, and the production of crude rubber is also comparatively insignificant, the exports of the latter product to foreign countries through the port of Bangkok during the fiscal year ended March 31, 1918, amounting to only 720 piculs (1 picul equals 133 1/3 pounds), valued at $13,223, against 697 piculs, valued at $12,671, in 1916. The foregoing figures include rubber substitutes also, but not the rubber exports from the Siamese Malaya, for which statistics are not available.

Rubber Factory Hazards to be Discussed

Executive Committee of Rubber Section of National Safety Council Meets in Chicago, January 20 and 21—Tentative Program for 1920 Safety Congress

A census of all the accidents that have occurred in the rubber industry will be undertaken by the Rubber Section of the National Safety Council with the view of standardizing accident prevention activities and accident statistics in that industry. This was decided on at a meeting of the Executive Committee of the Rubber Section, held at the headquarters of the National Safety Council in Chicago on January 20 and 21. Among those present were S. M. Schott, of the Morgan and Wright plant, of the United States Rubber Company, Detroit, Michigan, chairman of the section; E. H. Fitzgerald, Federal Rubber Company, Cudahy, Wis., vice-chairman of the section; R. M. Watson, The Goodyear Tire and Rubber Company, Akron, Ohio, secretary, W. N. Fitch, B. F. Goodrich Company, Akron, Ohio, chairman of the Bulletin Committee, and H. T. Martin, of the Fisk Rubber Company, Chicopee Falls, Mass., chairman of the Program Committee.

Plans for Membership Campaign

Plans were also laid at this meeting for a nation-wide membership campaign with the view of including in the Rubber Section of the Council every progressive rubber or rubber products plant in the country. The officers of the Section laid the ground work for an extensive bulletin service and for a sectional program at the next annual congress of the National Safety Council. Twenty-six bulletins depicting the principal hazards in the rubber manufacturing industry and methods of their elimination will be issued by this section of the Council during the ensuing year. One of these bulletins will be sent every week along with the general bulletins of the Council to each of its members in the Rubber Section.

The tentative program for the 1920 safety congress calls for three sessions of the Rubber Section. On Wednesday the reports of committees will be followed by papers on "The Present and Future of Safety in the Rubber Industry," "Health Hazards in the Rubber Industry" and a general round-table discussion of these topics. Wednesday's program includes papers and discussions on the following: "Making Mills and Calenders Safe," "Handling Materials," "Vulcanizing Apparatus." On Friday the election of officers will be followed by formal papers and discussions of "Industrial Sanitation" and "Methods of Educating Workmen in Safety."

Mr. Watson was appointed chairman of the committee which will investigate accidents and accident statistics with the view of standardization. The findings of this committee and the classifications recommended will be presented at the next safety congress. Mr. Martin was appointed Chairman of the committee on standardization of safety rules and safety instruction.

Members of the Rubber Section

The companies that are now members of the Rubber Section of the National Safety Council are as follows:

Batavia Rubber Company, Boston Woven Hose and Rubber Co., Braender Rubber and Tire Co., Dunlop Tire and Rubber Goods Co., Ltd.; Electric Hose and Rubber Co., Federal Rubber Company, Firestone Tire and Rubber Co., Fisk Rubber Co., General Tire and Rubber Co., Gillette Rubber Co., B. F. Goodrich Co., Goodyear Tire and Rubber Co., of Canada, Ltd.; Goodyear Tire and Rubber Co., Gutta Percha and Rubber, Ltd.; Hood Rubber Company, Kelly-Springfield Tire Co., McGraw Tire and Rubber Co., Mechanical Rubber Co., Miller Rubber Co., New Jersey Car Spring and Rubber Co., Inc.; Norwalk Tire and Rubber Co., Oak Tire and Rubber Co., Pennsylvania Rubber Co., Philadelphia Rubber Works Co., Plymouth Rubber Co., Quaker City Rubber Co., Racine Rubber Co., Republic Rubber Co., Rotary Tire and Rubber Co., Sprague Tire and Rubber Co., Stowe and Woodward Co., Thermoid Rubber Co., United States Rubber Co., and United States Rubber Reclaiming Co., Inc.

Goodyear Buys Warehouse

The Goodyear Tire and Rubber Company, which has been seeking a great central depot near New York City for some time, has acquired through Joseph P. Day the modern structure erected by the Ford Motor Company in Long Island City. The deal is one of the largest consumated in the Queens industrial district in some time.

The Ford building is one of the finest and largest plants in the country, and has been under active negotiations for the last month. This building will be used by the Goodyear Company for an Eastern warehouse. It is located on Jackson Avenue, within three blocks of the Queensboro Bridge approach and within two blocks of the Beebee Avenue Subway station of the Astoria elevated line, which connects the Bridge Plaza station with all subway and elevated lines from Brooklyn, Queens and New York. It consists of an eight-story and basement reinforced concrete building containing about 500,000 square feet of loft space of the most improved type of construction. It has five freight elevators and one passenger elevator. The property is served with a siding from the Long Island Railroad. There is a five-ton electric traveling crane located in the building under which six additional freight cars can be spotted.

Master Tire Increases Stock

Stockholders of the Master Tire and Rubber Company, of Dayton, Ohio, at a meeting held January 27, authorized increase of the present capitalization of the company from $300,000 to $1,000,000. Of the amount $300,000 will be common and $400,000 second preferred. Shareholders will have the first opportunity to subscribe.

The increase was made to care for sales developments. The company has already sold 800,000 tires, although factory production has not yet been started. A six-story tire factory will be built at Leo and Schaeffer streets early in the spring of 1921. The plant now under construction at Leo street and the B. and O. railroad will be ready for occupancy in March, officials say.

Several sets of tires built under specifications of the company are now being tested in Dayton. The tires are built to carry a flat guarantee of about 10,000 miles.

Miller Business for 1919

Instead of a "nearly fifty per cent" increase in 1919 sales volume, compared with 1918, as predicted a few weks ago by an official of the Miller Rubber Company, of Akron, Ohio, the actual figures, now available, show that company's selling growth to have been slightly more than sixty per cent over the 1918 mark. Nineteen nineteen was easily the record Miller year. Whereas an approximately $5,000,000 increased business in 1918 over 1917 was the biggest showing up to that time in the history of the company, the 1919 growth over the previous year was close to $10,000,000.

How the Miller Rubber Company has grown in the last seven years from a sales volume of less than $2,000,000 to one of more than $26,000,000 is shown impressively in the following annual sales figures: 1913, $1,914,443; 1914, $2,574,930; 1915, $3,704,754; 1916, $6,675,184; 1917, $11,357,560; 1918, $16,522,707, and 1919, $26,476,211.

When William F. Pfeiffer, general manager of the company, was asked concerning the 1920 prospects, he answered that a most conservative estimate of Miller business this coming year would be $40,000,000. In naming that figure, he pointed out that at the present time the company is oversold in spite of the fact that ordinarily at this time manufacturers are stocking up with merchandise in preparation for spring delivery. Mr. Pfeiffer added that the concern's building operations have reached that stage where the installation of comparatively little equipment will enable it to do approximately $50,000,000 worth of business annually.

Announcement has also been made that, in order to accommodate the growth in production and sales, the capital stock of the company is being increased from $20,000,000 to $60,000,000. Ten million dollars' worth of preferred stock was placed on the market January 22.

During 1919, new branches were instituted in each of the following cities: Albany, N. Y.; Cedar Rapids, Iowa; Charlotte, N. C.; El Paso, Tex.; Erie, Pa.; Great Falls, Mont.; Jacksonville, Fla.; Memphis, Tenn.; Oakland, Calif.; and San Francisco. Since the first of January, 1920, branches have been opened in Cincinnati, Ohio, and Phoenix, Ariz.; with twelve other cities in contemplation for Miller branches in the near future.

Portage Opens Milwaukee Branch

Increasing business in Wisconsin and the adjoining territory has resulted in the necessity for additional branch representation in that section by the Portage Rubber Company, Barberton, Ohio. The branch was opened at 450 Jackson street, Milwaukee, Wis., on February 2, to aid in the greater distribution of Portage tires and tubes which is expected in this territory during the year. The location on Jackson street is very advantageously situated, having previously been used by several other tire companies as branches.

P. S. Manley, formerly salesman at the Portage Chicago branch, has been appointed branch manager. Mr. Manley has had considerable experience in the rubber industry, and formerly was one of the leading salesmen of the Empire tire and later of the Brunswick. Six salesmen have been assigned to work out of this branch, and Mr. Manley expects to report a large volume of business for the present year, a feeling manifested in their territories by all Portage branch managers.

Akron Tire Production Increases

Increasing Demand for Tires Results in Manufacturers Specializing on This Product—Akron Firms Expect to Double Output in 1920—Additional Workers Cause Housing Problem

Akron, the world's greatest rubber manufacturing center, is destined to gain greater fame as "Tire Town" than it did as "Rubber City."

The change in identity is being wrought by the rapid growth of the automobile industry—a growth more rapid than even the most optimistic of tire manufacturers had pictured.

The tire output, curtailed during the war because rubber factories were needed for other work, has fallen far below the demand. Some factories have sold their tire production for a year ahead. Statisticians estimate that the present production is twenty-five per cent below the demand.

To put their factories on a basis by which production will equal demand, rubber manufacturers in the Akron district have dropped other lines and specialized in tires. The tire output for 1920 will be practically double that of 1919 as a result.

Firestone Opens Plant

The Firestone Tire and Rubber Company some time ago announced that the opening of Plant No. 2 would give a production of 38,000 tires a day. The very latest in tire-making machinery was installed to speed up output. Now, it is reported that most of this improved machinery is to be taken out and new devices that will make production even greater, installed. The new machines are referred to as "tire-making wonders."

Not only has the Firestone planned the installation of more modern machines, but space formerly set aside for other manufacturing purposes is to be diverted into tire manufacturing, it is said.

It has been reported that the Firestone Company has purchased a boot and shoe factory at Hudson, Mass., and will pass up the plan to make rubber footwear at the Akron plant. This move, however, is believed to have been made because of unsatisfactory labor conditions in Akron. Housing conditions are such that it is hard to get enough workers to man all the tire machines, let alone rubber footwear and other side lines.

Plants Increase Production

What is true with Firestone holds good with Goodyear, Goodrich, Miller, and other rubber factories in Akron or surrounding towns.

Goodyear's Plant No. 2 is now on a production basis of 20,000 Ford sizes a day. This plant will build nearly six million small car tires this year if the present rate of production is maintained. Officials say that the company is far behind its orders for these sizes.

Men are available to keep the plant working to capacity, it is said. The latest modern tire building and curing machinery is a factor in Plant No. 2 daily output.

The Goodyear firm, it is announced, has taken over the Ford Motor Company's Long Island City plant for storage purposes. The Ford plant was used during the war for the manufacture of gas masks. The motor company abandoned it because it established a larger plant in New Jersey.

The Goodrich Rubber Company is making great extensions to keep its tire production abreast the increased demand. Not only are huge factory buildings in the course of construction, but Goodrich is utilizing all available space in present structures for tire departments.

Transportation Needed

Home and transportation facilities, Akron city officials say, are imperative needs to supply the 15,000 additional workers who will be needed in Akron industries this year. A new drive for the construction of dwellings is under way, and traction company officials are considering asking a higher grade of fare in order to make needed extensions.

In emphasizing these needs, a chamber of commerce announcement says:

The Firestone Steel Products Company's plant is under way and will be completed in a few weeks. It is estimated that at least 1,500 will be employed there.

The General Tire and Rubber Company has a new $250,000 addition under way, and several hundred workers will be needed when machinery is placed and the plant opened.

The Doyle Rubber Company recently incorporated for $300,000 by the family of Judge D. A. Doyle has plans for a small building to be built as the first unit of a larger plant on thirty-five acres. It is believed that within the next four months the plant will be ready for operations.

The Portage Rubber Company has broken ground for an addition of two stories 100 feet long and 80 feet wide in which it is estimated 200 persons will find employment.

The Excel Rubber Company, Wadsworth's newest manufacturing plant, will be ready by spring to open its first unit to several hundred men.

The Phoenix Rubber Company will have ready by spring a new three-story building, 120 feet by 60 feet.

Excel Rubber to Build

The Excel Rubber Company, Wadsworth, Ohio, with capital of $600,000, is building a two-story brick building 110 x 180 feet, for the manufacture of "Flint Cord" tires, "Excel" fabric tires and all kinds of tire necessities. The production of tires will begin about April 1. This company has secured the services of men capable of producing high-class goods, and also has a well-established sales organization. The production for the first year will be about 200 tires per day. The company owns twenty acres of land along the main line of the Erie Railroad. The officers of the company are Wadsworth business men. M. H. Leatherman, president; H. D. Mench, vice-president, and R. M. Trump, secretary and treasurer.

Quality Increases Production

The Quality Tire and Rubber Company is running in all departments and is turning out about 250 tires per day. It is planned to have this production increased to 500 per day not later than the first of April. Contracts have already been made to take care of all of the tires that the company can produce. About 150 men will be given employment at the plant when the production is increased. Some additional machinery will be required for this change. No additional buildings are planned for this year. By late spring the plant will have a capacity of 3,000 tires weekly or 150,000 yearly.

Goodrich to Increase Capital

Stockholders of the B. F. Goodrich Company have been called into a special meeting on March 10 to act on the recommendation of its directors to increase the company's capital stock by the issuance of $30,000,000 of five year 7 per cent convertible gold notes, convertible into common stock at 80. The stockholders will be asked in the meeting to change the company's common stock from its present basis to no par value shares, and increase the number of shares of authorized common stock to provide for the conversion of the new notes. Purchase of the company's stock by its employes is recommended by the directors, and some of the new stock, if authorized by the shareholders, will be placed at the disposal of the employes for subscription.

Details of the proposed financing have not been given out. A syndicate headed by the Guaranty Trust Company, the Bankers Trust Company, Goldman, Sachs & Co. and Lehman Bros., has been formed to underwrite the issue, but the terms have not been announced. It is understood that the Goodrich Company's stockholders will be given the right to subscribe to the new gold notes at an attractive price.

Another rubber manufacturing company, the Republic Rubber Corporation, has announced its intention to increase its capital stock, subject to its stockholders ratification. A meeting of these stockholders has been called for February 20 to vote on that proposal, which includes issuance of 850,000 shares of new common stock, bringing the company's total capital stock from $15,750,000 to $20,000,000. The need of additional working capital to take care of its expanding business is given as the reason for the proposed increase.

New Crude Rubber Firm

Duffy and Sears is the name of a new firm which has been organized to deal in crude rubber at 133 Front street, New York City, with Louis A. Duffy and Stephen H. Sears as the partners.

Louis A. Duffy started in the rubber business with the New York Commercial Co. in 1902. In 1907 he was transferred to the firm's Manaos house, A. H. Alden and Co., where he remained for two years. In 1913 he became identified with W. R. Grace and Co., of New York, and three years later resigned and became associated with the Hagemeyer Trading Company, also of New York, as assistant-manager of the crude rubber department. He remained with this firm for two years and after a few months with J. Frank Dunbar Company resigned to form the partnership with Mr. Sears.

Stephen H. Sears also served his apprenticeship with the New York Commercial Co. and was identified with the firm from 1903 to 1911. He then went with the Firestone Tire and Rubber Co., of Akron, Ohio, as crude rubber expert. In 1916 this firm sent him to the Far East where he visited the Malay Peninsula, Java and Sumatra. Mr. Sears was manager of the Firestone crude rubber department when he resigned to enter into his present business connection.

Van der Linde Rubber Dividend

The Van der Linde Rubber Company, Limited, of Toronto, Canada, has declared its usual semi-annual dividend at the rate of seven per cent to shareholders on record January 1, 1920.

News from the Rubber Metropolis

Tire Advance in the Near Future—Freund with Swinehart—Goodrich Business for 1919—Exports from Akron Increase—Europeans Seek Rubber Heels—Goodyear Industrial Film

Tire Advance in Near Future

(Special Akron Correspondence)

An advance in tire prices before the middle of the coming spring is generally predicted in Akron rubber circles. The price increase was expected in many quarters last month, but did not materialize.

Commenting on the rumors the first issue of General Tire News, issued by the General Tire and Rubber Co., says:

Early in October rumors of a price advance were current among the tire trade. Fabric prices had risen. Many of the smaller manufacturers and a few of the larger ones, who had not adequately protected themselves with fabric stocks, saw the early necessity for an advance in tire prices. A great many of such companies were premature in announcing or passing the word along to tire users that an immediate advance would take place. When the advance did not come, as those companies had led the user to expect, the user naturally felt that the gossip had been manufactured to stimulate his purchases.

While there is no doubt that a few of the companies had taken advantage of the condition in that way, it is also true that the majority of them were acting in good faith, but with the difference that they acted upon what they hoped would take place, rather than upon any definite information. The real answer to the situation lies in the fact that The General Tire and Rubber Co. and others among the larger manufacturers have never favored kaleidoscopic price changes in line with every disturbance of the raw material market. Through the exercise of foresight and large purchasing power we are able to take advantage of the most opportune times for stocking up on fabric and other materials. This method, as opposed to the purchasing of materials from month to month, gave to us the same capacity that the several other companies enjoyed, for withstanding the rapidly rising fabric cost during the past several months.

It is almost a certainty that tire prices will have to advance before the middle of spring. This is so even among those of us who have been best situated on material, for the ample reason that tires manufactured after the exhaustion of reserve stocks of fabric must necessarily be made from the fabric purchased at higher prices.

In the case of a material decline in the fabric market such an advance may be avoided. The General Tire and Rubber Company does not wish to be quoted as authority for advance purchases, neither do we wish to withhold the benefit of such action from purchasers whose requirements are large.

Freund with Swinehart

(Special Akron Correspondence)

A. W. Freund, of Chicago, has joined the Swinehart Tire and Rubber Co. staff as head of a new department to be known as the national sales development department with headquarters in Akron. Increase in sales throughout the country has made necessary the opening of the new department, it is said. Mr. Freund was formerly general manager of the Federal lamp division of the General Electric Co. He has had wide experience as a director of sales.

Goodrich Business for 1919

(Special Akron Correspondence)

Directors of the B. F. Goodrich Rubber Co. at their recent quarterly meeting announced that sales for the last year were $141,800,000, and that net profits were $17,250,000 after provision for maintenance charges, depreciation and doubtful debts, but before allowance for federal taxes.

These figures compare with $123,470,147 net sales for 1918 and $87,155,072 in 1917, while net profits in those years amounted to $15,637,114 and $10,544,677 respectively.

Directors declared the regular dividend of three and one-half per cent on preferred stock, payable one and three-quarters per cent April 1 and one and three-quarters per cent July 1; and also an additional dividend of one-half per cent on the common stock which, with a dividend of one per cent. declared last October, makes a total of one and one-half per cent payable February 16 to holders of record February 5.

A dividend of one-half per cent on the common was declared payable May 15 to holders of record May 5.

Exports from Akron Increase

The exports to Europe from Akron this year will amount to approximately $20,000,000, officials in the foreign departments of the rubber factories said recently.

A large amount of the goods recently sent to Europe went to Germany, and the agents who are purchasing the goods, although they represent themselves as being employed by houses in Switzerland, Holland and Denmark, make no secret of the fact that the goods will eventually reach Germany. The European countries are purchasing mostly tires.

It seems that the tire market in Europe cannot be supplied with tires for the automobiles which are being operated, and the representatives are asking for goods at any price, it was said.

The great disparity in the value of European money and American money is making the cost of rubber goods in Germany and other countries much higher than in this country, and this fact is to a certain extent hampering trade with those countries which cannot afford to purchase goods at this figure, it was said.

Germany apparently wants goods at any figure and is ready to pay any price.

Akron is receiving visitors from European countries in large numbers, it was reported at all of its factories.

Europeans Seek Rubber Heels

(Special Akron Correspondence)

European buyers, now in Akron, are understood to have made bids for the entire output of rubber and composition heels and soles of Akron rubber factories for the next five years. The shortage of leather has made it necessary for Europeans to seek substitutes for making shoes and naturally they turned to Akron.

For several weeks two representatives from Denmark and Norway have been in Akron negotiating with manufacturers. Thus far the needs of these countries have not been contracted for, it is said.

Goodyear Industrial Film

What is perhaps one of the most interesting industrial and educational moving pictures ever filmed, showing details of the rubber industry, which has grown to be the greatest in the world, with the exception of steel fabrication, has just been completed by the Goodyear Tire and Rubber Company.

Starting with a view of crude rubber as it arrives after its long voyage from the company's own plantation in Sumatra—having traveled 10,000 miles by every form of transportation from sinewy natives to modern railroads—the "Story of a Tire" takes the reader step by step through the various intricate manufacturing processes until the tire is ready to deliver its thousands of miles for pleasure or business.

Machines that clean, mix and roll the rubber, almost-human looms for weaving the fabric, the dexterity of the tire builders and giant, steaming pits where the casings are cured, are depicted with a vividness and fidelity that epitomize modern industry. There is not a dull moment in the three reels showing the activities of 28,000 employes turning out the thousands of pneumatic tires that will bring vacation joys and business convenience to millions of motorists throughout the world.

"The Story of a Tire" visualizes the descriptions given in the booklet of the same name, which was published by the company recently as an educational feature and which more than 8,000 schools, libraries and colleges are using for educational and reference purposes.

The moving picture was made by the company's own corps of experts and cameramen under the direction of Ralph M. Lembeck, formerly a cameraman with the big producing companies and widely known in the cinema world.

Prints of this two-reel film may be obtained free by industrial firms for educational purposes by applying to the moving picture department of the company in Akron, Ohio. It will be loaned to any responsible company or educational institution and arrangements for bookings should be made by letter.

Dorland and Caxton Combine

Senator Walter E. Edge, proprietor of the Dorland Advertising Agency, with offices in New York, Washington, Atlantic City, London, Paris and Buenos Aires, and Barrett Andrews, president of the Caxton Advertising, Inc., New York, announce a consolidation which will hereafter operate under the name of the Dorland Agency, Inc., with the following officers: Walter E. Edge, chairman, board of directors; Barrett Andrews, president; Clyde S. Thompson, vice-president; Henry H. Creske, vice-president; A. E. Oakes, treasurer, and R. A. Porter, secretary.

By this combination of personnel, the clients of both agencies have the advantage of not only a complete American organization, but in addition will have the benefit of the long established and internationally known foreign service of the Dorland Agency. This consolidation became effective February 1, 1920.

Philadelphia Rubber to Build

(Special Akron Correspondence)

Officials of the Philadelphia Rubber Co., reclaimers of rubber, have announced plans for the first unit of a large plant to be built in Buffalo, N. Y. The ground for the new factory has been purchased and the ground will be broken in the spring. The present plant at Akron will be continued.

Syracuse Completes Plant

Announcement that the Syracuse Rubber Company, Inc., is practically ready to start manufacturing at its plant in Eastwood, N. Y., was made recently by George R. Loggie, general manager.

The main plant structure, three stories high, 200 by 60 feet, and the auxiliary buildings housing the power and pump machinery, are completed. The overhead personnel of the organization is at work. The working force is already in Syracuse. These are facts contained in the official announcement.

Within a month at the least, possibly within two weeks, it is expected the plant will be operating. The immediate scheduled capacity production rate is of 700 tires and 1,000 inner tubes daily. It is anticipated that the second factory unit, 106 by 80 feet, will be started as soon as the open season is here.

A force of experts for the overhead of the plant has been retained and is on the ground. Among these, with their last former affiliation appended, are the following: K. D. Smith, chief chemist, Miller Rubber Company, Akron, O.; C. M. Butler, credit manager, Miller Company; W. E. Greer, superintendent of tire construction, Miller Company; W. E. Callow, auditor, Garden Savings and Trust Company, Cleveland; F. A. Mauthe, sales manager, B. F. Goodrich Company; A. H. Gill, crude rubber expert, Miller Company; E. C. Paul, efficiency engineer, Goodyear Tire and Rubber Company, F. G. Bean, comptroller, Miller Company; V. L. Pontius, superintendent of the tube department, Goodrich Company; Ray Meeker, in charge of preparation of materials, Diamond Tire Company, and G. R. Pahle, adjuster, Diamond Company.

The Syracuse Rubber Company, Inc., is capitalized at $3,000,000, one half common. According to Mr. Loggie's statement there remained for sale January 22, 1920, approximately $100,000 worth of the preferred issue. He estimated there is still outstanding on the market about $70,000, which is being absorbed in earlier markets in which stock was moved.

The company has acquired twenty building sites in Eastwood to meet a possible early difficulty of its employes in obtaining places to live. If necessary these sites may be built up with company suppor.t.

Tuscora Rubber Builds

Work upon the plant of the Tuscora Rubber Company, at East Philadelphia, Ohio, is progressing rapidly and officials of the company state that production will probably begin about June 1.

Officials of the company are enthusiastic over the possibilities of the plant. The natural resources promise cheaper production, they say. Especially are they pleased over five artesian wells which have been drilled beneath the main building. Water from these wells is ice cold and will be of enormous value in cooling the machinery when it is installed.

The main building, 500 feet long and 78 feet wide, of concrete construction, is up to the second story. When the plant is completed, 75,000 cubic yards of sand and gravel, 55 cars of cement and 10 cars of steel reinforcing will have been used.

The "one-way" system will be installed. That is, the raw product will be unloaded at one end of the building and will emerge from the other end of the building the finished product. There will be no "backtracking" of the product as it goes through the factory.

When the plant first begins operation, approximately 400 persons will be employed. Officials expect to employ close to 1,000 persons within a few months after operations begin.

Financing of the company is in its last stages. Phenomenal success has been met by the promoters. The company was incorporated on July 1, 1919, with a capital stock of $2,500,000. Almost a half a million dollars' worth of stock represents Tuscarawas county capital.

Southern Firm to Enlarge

The Diamond Holdfast Company, of Atlanta, Ga., is contemplating extensive additions in the near future. The company will erect an extensive plant on the outskirts of Atlanta and several sites are already under consideration. The plans, which have been accepted, call for a forty-five acre location and when completed the plant will be one of the largest of its kind in the South.

The firm manufactures a patented patch for automobile tires, which product was originated by them. In addition to this it makes a rubber fan belt which has grown to be one of the most popular belts today on the market, as well as other rubber goods made under patented process. At the present time the firm is beginning the manufacture of an electrical tape, to be used in the insulation of electric conduits. Previously it has been necessary, in order to insure proper insulation, that wires be wound with two separate kinds of tape. The result has not only been expensive, but it has caused many cases of faulty insulation, by reason of the temptation offered to a careless or lazy workman to use only one tape when his supply of the other ran short. The new patented tape made by this company takes the place of both the others. It is priced only the same as either of the other tapes, and is thus more economical to use. It is also an important factor in the reduction of the fire hazard from faulty insulation, in that it eliminates the double wrapping process.

In addition to the Atlanta factory the company has branches at New York, New Orleans and Richmond. It is practically entirely due to the future possibilities of the South, through the expected port developments, that they have decided to construct the new plant at Atlanta. The growth of the company has been entirely industrial and not capitalistic. All past expansions have involved an opportunity for the firm's employes to purchase the stock of the company on exceedingly attractive terms and any further expansion of capitalization, which will undoubtedly be included in the reorganization incident on the building of the new factory, will likewise be first offered to their own employes and officers.

Pennsylvania Rubber Elects

At the annual meeting of the stockholders of the Pennsylvania Rubber Company, held in its offices in Jeanette, Pa., the following were elected directors: Herbert DuPuy, H. Wilfred DuPuy and Charles M. DuPuy of Pittsburgh; Seneca G. Lewis of Greensburg, and George W. Daum of Jeanette. The directors elected the following officers: Herbert DuPuy, chairman of the board; H. Wilfred DuPuy, president; Charles M. DuPuy, vice-president; Seneca G. Lewis, vice-president and general manager; George W. Daum, assistant general manager; A. H. Price, treasurer; George W. Shively, secretary; James Q. Goudie, general sales director; C. G. Merrill, assistant treasurer; H. H. Salmon, purchasing agent.

Washington Tire Increases

The Washington Tire and Rubber Company, situated in Spokane, Wash., entered its first full year's production on January 1, 1920. This company started operations in a small way in May, 1919. The production will reach 200 casings and 200 and more tubes per day during February, to be increased from month to month. At the present time 120 workers are employed, ninety-four per cent of whom are stockholders in the company.

Although its estimated production for 1920 was placed at 60,000 casings and 40,000 tubes, it is believed that the demand for its product, which is being marketed under the trade name "Western States," will compel it to increase the estimate to 100,000 casings and 100,000 tubes this year.

This company has distributed its product within a 200-mile radius of Spokane, the home of the institution, but the territory will be materially enlarged as time goes on. Western States tires are being used on the bus and stage lines as well as taxi service in a great many towns throughout the inland empire and are giving satisfactory service, some having rolled up as high as 9,000 miles. It is distributing through 132 dealers, all of whom are financially interested in the corporation.

The officers of the company are all representative and well-known Spokane business men. The president of the company is A. G. Hanauer, vice-president is T. S. Lane and secretary-treasurer is H. S. Burdick. The capital of the company is $1,500,000.

Western States tires are all over-size and extra-ply and advertised as a quality product. The company will eventually build cord tires, although at present it is manufacturing fabric exclusively.

Empire Rubber Personnel Changes

The Empire Rubber and Tire Company, Trenton, N. J., has announced the acquisition of F. I. Reynolds as vice-president and general sales manager. Mr. Reynolds was formerly a sales executive with the Diamond branch of the B. F. Goodrich Company. Later he became identified with the United States Tire Company as manager of pneumatic tire sales through the trade. In 1919 he became general sales manager of the Keystone Tire Company. Mr. Reynolds and W. G. Heath will also be upon the board of directors in places left vacant by the recent resignations of President J. E. Baum and Treasurer J. Cornell Murray. W. M. Pepper, a member of the board of directors, has been elected president of the company.

W. A. Reynolds, J. Baker Taylor and R. V. Dickinson, all formerly with the United States Tire Company, have also become identified with the Empire Rubber and Tire Company. S. H. Smith, former factory manager of the Gillette Rubber Company, Eau Claire, Wis., will be the plant manager, while C. Edward Murray, Jr., has been elected to the office of vice-president and treasurer and H. R. Nason has been elected secretary.

Samson Moves to Los Angeles

Announcement of the removal of the executive offices of the Samson Tire and Rubber Corporation to large and commodious quarters at 333 West Pico street, Los Angeles, Cal., was made recently by Adolph Schleicker, president of the concern. The service branch of the company has been established at this address for several months.

Personals of the Rubber Trade

Firestone Chooses Three New District Representatives—Recent Promotions at Goodyear Tire and Rubber Co.—F. N. Hammond Appointed Special Representative by Portage Rubber Company

Recent Firestone Promotions

Announcement has just been made of the promotion of three well-known Firestone men, namely, J. H. McDonough, L. R. Jackson, and I. E. J. Rauscher.

J. H. McDonough, newly appointed district manager of the Southwestern territory, with headquarters at Dallas, is an Akron man. He was born in Tallmadge, Ohio, and moved to Akron in 1900, where he attended both the public schools and Central High School, graduating in 1909.

C. A. Jones

He came to Firestone the following year, and worked in conjunction with district managers and branches upon various phases of sales organization until he was put in general charge of salesmen in 1918. During 1919 he served as Akron district representative. As manager of the Southwestern district Mr. McDonough will have an important and responsible part in meeting the company's sales quota of $150,000,000 worth of tires announced for this year.

L. R. Jackson, as manager of the Pacific Coast district, with headquarters at San Francisco, is one of the most popular men in the sales organization of the Firestone company. Mr. Jackson is also a native of Akron and a brother of Bernice Jackson, director of girls' recreation at Firestone.

The newly chosen district manager has been with the company approximately eight years. He started as office manager for the Atlanta branch in 1912, and was transferred to Detroit one year later, working out of that city as salesman. After three years of valuable experience along this line, Mr. Jackson went to the Grand Rapids branch, where he held the position of service manager until 1918, when he became manager of the Indianapolis branch. Here he established an enviable record and gained in an unusual degree the good will of automobile, truck, and tire interests throughout the territory. Mr. Jackson's association with and knowledge of the tire industry renders him peculiarly qualified to discharge the responsibilities connected with his new position.

I. E. J. Rauscher has been chosen district representative of truck tire sales for the south central territory. Mr. Rauscher came from Cincinnati two and a half years ago, entering Firestone employ in the manufacturers' sales department. About a year later he joined the force of the Western truck tire department where he has been located until now.

Promotions at Goodyear

With the promotion of I. R. Bailey, manager of the mechanical goods department of The Goodyear Tire and Rubber Company of Akron, to the position of assistant sales manager, two other changes in the Goodyear organization are announced. D. R. Burr, formerly assistant manager of the mechanical goods department, becomes manager, as successor to Mr. Bailey. Mr. Burr in turn is succeeded by C. A. Jones, who has served as manager of the hose, railroad supplies and rubber band departments of the mechanical goods division.

Mr. Burr has been with the Goodyear Company since 1913, joining the company as assistant manager of the mechanical goods department of the Chicago district after having served in a like capacity and also as salesman for a competitive rubber concern. In June, 1916, he was transferred to Akron and made Mr. Bailey's assistant. Recently he returned from an eleven months' trip to Australia where he made an extensive industrial survey. Mr. Burr was educated at Columbus, Ohio, and started his business career there as a bill clerk with a wholesale hardware concern, later launching into business for himself in Miami County, Ohio, where he was engaged in the sale of mill supplies.

D. R. Burr

Mr. Jones is a "rubber city" product. He was born and educated in Akron, joining the Goodyear company eight years ago. Prior to that time he was with other rubber concerns in estimating cost work on rubber specialties and as assistant in charge of production. Mr. Jones joined Goodyear when the mechanical goods department consisted only of molded goods such as tiling, bumpers and rubber soles and heels, and sold the first thousand pair of Goodyear rubber soles to shoe manufacturing concerns.

Hammond Portage Representative

Announcement is made by the Portage Rubber Company, Barberton, Ohio, of the appointment of F. N. Hammond as special representative of the sales department. Mr. Hammond is well known among tire men and has an extensive knowledge of the needs of the retail industry.

I. R. Bailey

Mr. Hammond made a decided success as Goodyear branch manager in Cleveland for a number of years. In Detroit as Kelly-Springfield branch manager he greatly increased the sales in the state of Michigan, and a reflection of his past successes is seen in his appointment by the Portage Company.

New Manager for New Tread

Eric P. Altenburg, vice-president and general manager of the New Tread Tire Co., of Columbiana, Ohio, has had a long experience in the rubber business and has served twenty-two years in the industry. Beginning at the age of fifteen he spent three years with the Goodyear Tire and Rubber Co. and later became identified with the B. F. Goodrich Co., remaining with that firm from 1902 until 1909. Following that he was identified with the business and was for five years superintendent and factory manager.

Prior to his coming to the New Tread Tire Co., Mr. Altenburg spent two years in Havana, Cuba, supervising the designing, erection and operation of a modern rubber factory.

During his career in the rubber industry Mr. Altenburg has made a number of improvements in equipment and machinery, principally in the line of labor saving and safety devices.

Philippine Rubber Lands Opened

American rubber interests are looking toward the Philippine Islands as a fertile field for the development of the American rubber industry. The rubber companies are being forced to seek new fields to obtain stocks as the result of the increased demand for tires and other rubber goods this year. Experiments in growing rubber in the Philippines have been very successful, it is reported, and it is said that one large American firm is contemplating the expenditure of upward of $35,000,000 in rubber plantations in our island possessions.

The Government of the Islands is willing to do all in its power to aid in the development of the business. A cable has been received from Secretary Jackosalem, of the Bureau of Commerce and Communications, at Manila, by the Philippine Commercial Agency, in New York, in which the secretary says: "Government offers in Basilan and Mindanao rubber plantations situated near port of entry of Cebu and Zamboanga and on routes of established coastwise commercial transportation service. Regions outside typhoon zone possess unsurpassed natural conditions for profitable production of rubber. Labor bureaus give facilities to planter. Matter of leasing on extremely favorable conditions whatever area required by bonafide rubber planting enterprises will be recommended to proper authorities."

Heretofore, the land laws of the Philippines have made it impossible for a corporation to own more than 2500 acres, but the plan outlined by Secretary Jackosalem apparently nullifies this proviso.

Rubber men believe, therefore, that it is possible that before many years a good part of the rubber used in the United States will come from the Islands, as there is no limit to the land available for rubber plantations and the rubber industry in the Philippines is still in its infancy. Crude rubber consumers would undoubtedly save considerably in buying the raw material should the industry be developed in the Philippine Islands.

Firestone's Canadian Plant

Firestone will soon have a good-sized community in Hamilton, Ontario, where the new Canadian plant is being built. Excavations are completed; foundations have been laid, and contracts for buildings and materials have been let.

Firestone owns 135 acres in Hamilton. Half will be occupied by the new factories, and upon the other part a home-building plan, similar to Firestone Park, at Akron, Ohio, will be carried out. The new factories, which will be constructed of steel and concrete, are to be of the unit plan construction, which will admit of further expansion as additional facilities are required. The floor-space will be 320,000 square feet to begin with. Production will commence in a few months with an initial capacity of 3,500 tires daily. A line of mechanical goods, including belting and boots and shoes, will likely be manufactured also. Plans are likewise now being made for the erection of a rim plant.

Hamilton was selected for the factory site because the company officials believe that it offers ideal living conditions for employes as well as having excellent transportation facilities for distributing the factory output. It has splendid railroad terminals, and Burlington Bay is one of the best harbors on Lake Ontario. Unlimited water power is available from Niagara Falls.

The company's official personnel includes R. H. Jeffers, vice-president and general manager; J. A. Norton, general auditor; O. W. Cook, general superintendent, and F. L. Shillington, purchasing agent. Mr. Jeffers and Mr. Norton are well known in the Firestone organization. The former was manager of the Firestone branch at Detroit, and the latter was auditor of subsidiaries at Akron. Mr. Cook is a Hamilton man, having been located there as manager of the Canadian Cartridge Company. Mr. Shillington comes to Firestone from Toronto, where he acted as purchasing agent for the Aeroplane Company of Canada.

The Firestone Tire and Rubber Company of Canada, Limited, is capitalized at $5,000,000. The established manufacturing and business policies of the parent plant at Akron will govern the new company, but it will operate as a Canadian organization, employing approximately 2,000 men and women of the Dominion.

Nebraska Tire Elects

The annual meeting of the Nebraska Tire and Rubber Company was held at the offices of the company, at Omaha, Nebr., on January 5. A large number of the stockholders were present and expressed their gratification for the results obtained so far. General Manager W. W. Wuchter presented to the stockholders the company's auditors' reports covering the past year's business. He also reported on the prospective year's business and stated the outlook was very good. He believes the increasing prices of rubber, fabric and labor will force an increase in the price of tires before very long.

A resolution was unanimously adopted changing the capital stock of the company to $200,000 preferred stock and $300,000 common stock, and authorizing the officers to offer for sale $100,000 of the new common stock.

The following were re-elected as a board of directors for the coming year: James E. Cornish, Tekamah, Nebr.; V. E. Holm, Wahoo, Nebr.; S. C. Wolfe, Craig, Nebr.; George W. Masson, G. C. Pieronnet, Alva Smith and W. W. Wuchter, of Omaha. The board of directors later re-elected the following officers for the year: Alva Smith, president; G. C. Peironnet, vice-president; F. M. Holloway, secretary; W. W. Wuchter, general manager and treasurer.

Allen Machine Opens Office

The Allen Machine Company of Erie, Pa., has recently opened an office at 17 West Forty-second Street, New York. This office is in charge of Morris A. Pearson, who has had over twenty years' experience in rubber machinery engineering. The Allen Machine Company is manufacturing a complete line of machinery for the tire trade. The firm is paying particular attention to the export trade and is experiencing excellent sales of Allen tubing and skiving machines in foreign countries.

Guayule Industry Revived

If adequate railroad transportation facilities are available, the shipments of crude guayule rubber from Mexico to the United States will show a big increase during the next few months, according to reports received here from the district around Torreon, where the guayule rubber industry is chiefly centered. It is stated that a number of rubber-manufacturing plants that have been closed during the last several years are preparing to resume operations.

The protracted idleness of the rubber-manufacturing plants has enabled the reproduction of the wild guayule shrub upon millions of acres of land from which the original growth had been obtained. This gives the factories a much larger available supply of the raw product that they would have otherwise had, it is stated. During the year 1910, which was that in which Francisco I. Madero, Jr., started his revolution that precipitated the country into a period of almost uninterrupted disorder that is still being felt, the value of crude guayule rubber exported from the Torreon consular district was approximately $60,000,000 gold.

Egyptian Cotton Conditions

The following résumé of Egyptian cotton conditions sent from Alexandria on January 2 has been received by the Alexandria Cotton Company, Ltd., of Boston, Mass.:

Since our last report, the futures market has continued its upward movement and prices closed today at the extraordinary level of $102.25 for January and $100.75 for March.

Exporters have somewhat neglected the futures market lately and it has been left in the hands of a few speculators who, taking advantage of the narrowness of the position, manipulate it more or less as they wish.

On the spot market prices have followed the advance of futures; there seems to be no end to the demand for medium and inferior Sakellarides which continue to be sold at very full prices.

Uppers are in rather poor demand, and their parity with Sakellarides has widened further.

Arrivals from upcountry for the season now amount to over four million cantars i.e. about 900,000 cantars in excess of the preceding year for the same period. Exports, however, have been heavier than last year by about a million and a half and the stock stands at 1,750,000 cantars against 2,985,000 a year ago.

Had it not been for the shortage of facilities for pressing cotton in Alexandria due to labor troubles and the fact that the military have not yet returned the presses which they requisitioned during the war, the actual stock would have been still lower as the bulk of it is held by exporters against their commitments to spinners and it is owing to the difficulties mentioned above that it has been shipped. Shipping facilities are quite ample.

STATISTICS FOR THE WEEK ENDING JANUARY 2, 1920.

	ARRIVALS	EXPORTS (Bales)			EXPORTS	TOTAL STOCK
	Cantars.	England.	Continent.	America.	Cantars.	Cantars.
This week	247,276	14,293	5,459	18,006	281,613	1,756,071
Same week, 1919.....	183,481	19,660	4,207	.....	175,748	2,984,079
Same week, 1918.....	200,011	19,018	272	.....	147,930	2,395,022
Since Sept. 1, 1919....	4,057,141	200,214	54,686	107,942	2,744,070	.....
Same time, 1918.....	3,175,109	148,137	15,939	11,792	1,297,830	.....
Same time, 1917.....	3,783,305	186,723	23,390	13,637	1,714,283	.....

MARKETS

Manufactured Rubber Goods

NEW YORK, February 7, 1920.

Manufacturers are clearing the decks for action, and the industry has already started on a year that promises to be a record-breaking one. The policy of the principal manufacturers of making their workers a part of their organization has borne fruit, and the rubber industry is not troubled by any general labor disturbances, such as have paralyzed other leading industries recently.

The trend of prices is apparently upward, it being only a matter of time when manufacturers must pass their increased production costs along to the consumer. Many of the raw materials entering into the manufacture of rubber and rubber goods have increased in price and the manufacturers cannot cut their margin any longer in taking on the burden of added raw material costs. Many chemicals and compounding materials are higher, and the market for fabrics used in the rubber industry is also on the upgrade. About the only thing, which has not increased in price is the crude rubber itself.

EXPORTS

Foreign exchange is falling to unprecedented low levels and export trade has also fallen off considerably. Many large consignments of manufactured rubber goods are going out to foreign buyers regularly, despite high costs brought about by the position of the exchange market. The trade is expecting a heavy demand for American rubber products to set in after the ratification of the treaty of peace by the Senate, when, it is believed, exchange will strengthen somewhat. Foreign buyers are taking druggists' sundries in considerable quantities, and a demand for mechanical goods is reported.

AUTOMOBILE TIRES

No general advance in the price of tires or tire tubes has been reported in tire trade circles. The undertone of the market is extremely bullish, however, and if the expectations of the trade are realized, the near future will see a higher basis of tire prices ruling.

An abnormal demand for tires is anticipated during 1920 and the tire-making plants are working at top speed to turn out enough tires to fill this demand. It is estimated that tire manufacturers will use 400,000 bales of cotton this year in the making of tires.

DRUGGISTS' SUNDRIES

The prevalence of influenza has resulted in a better demand for druggists' sundries of all descriptions and retail druggists are entering the market from time to time in order to fill up their depleted stocks. A good "run" on hot water bottles is reported, the better grades being in demand at the present time. Rubber gloves and surgical appliances are also meeting with a steady sale.

MECHANICAL GOODS

A routine inquiry for the various list of mechanical goods is reported at the present time. Manfacturers of marine specialties are doing a fair business, and in addition there is a good demand for belting reported. Demand for hose is seasonably quiet at this time of the year. The railroad administration has not come into the market for any quantities of hose or coupling as yet, and the trade is keeping close watch on the situation, as it is known that private owners of the various roads plan extensive overhauling of their rolling stock when their property is returned and naturally this will call for a good deal of new coupling and hose.

MISCELLANEOUS PRODUCTS

An active inquiry for rubber heels is reported by both distributors and manufacturers, and the market is steady. Rubber and fibre soles are quiet, demand having fallen off somewhat. The fibre soles do not "go" as well in the winter as in summer months, consumers placing more reliance in leather stock. And with money as plentiful as it is at present, the consumers are willing to pay more for what they want. Rubbers and arctics have been meeting with a good sale during recent stormy weather. Manufacturers are preparing their spring lines of footwear to submit to the trade. Owing to the high price of leather oxfords, makers of canvas rubber-soled and heeled oxfords are looking for a stronger demand than ever this season.

Cottons, Yarns, and Fabrics

NEW YORK, February 7, 1920.

Falling exchange rates, forcing British and other foreign buyers to curtail their purchases of American cotton, have resulted in a weak market on futures at the time of writing, although spot cotton is holding fairly strong under a good consuming demand for the staple for immediate delivery.

A report from England to the effect that Great Britain had on hand all of the cotton she would need for several months to come, and that consequently imports were to be prohibited, brought on a heavy selling movement of futures, and the market eased off considerably. Stocks of cotton at Liverpool on February 5 this year totaled 942,000 bales, as compared with only 406,000 bales on the same date last year.

Speculative interests have been largely forced from the market for the time being by the high rates on call money. With a rapidly weakening stock market, many of the operators who normally speculate in the cotton market are now devoting all their time and energies in looking after their stock holdings.

EGYPTIAN COTTON

Egyptian cotton receipts at the port of Boston continue fairly large, three cargoes reaching port with a total of 38,000 bales during the week ending February 5. The last previous cargo received from Alexandria totaled 16,000 bales. A strong market for the Egyptian long staple is reported, spinners of yarns for tire fabrics being active in the market. Fully Good Sakellaridis Egyptian cotton is reported held at $1.28 per lb., with Good Fair to Fully Good held at $1.21 per lb., both c.i.f. landed at Boston.

AMERICAN-EGYPTIAN COTTON

There is an active inquiry for domestic grades of Egyptian cotton reported, and the market is showing a strong tone. No. 2 and 3 grades of Arizona pima cotton are reported selling in Eastern markets on the basis of 95 cents per pound. A strong market for the domestic variety of long staple cotton is reported, tire manufacturers taking practically all of the production in the Southwest.

SEA ISLAND COTTON

Light offerings of Sea Island cotton are reported in Southern primary markets. Export buyers are reported in the market for the choicest grades, French spinners having made some purchases of extra fine islands stock. The market on No. 2 and choice, with average staple, is offering at 80 cents per pound in the Savannah market, according to Southern advices, while fine to fully fine is held at 85@86 cents per pound in Southern markets. Extra fine islands is held on the basis of $1.00@$1.40 per lb.

TIRE FABRICS

An active trade demand for tire fabrics is reported, and the market is showing a continued strong undertone. With tire manufacturers embarked upon what all signs indicate as another record-breaking year, fabric makers are having a hard time in keeping production up to the point required in filling their orders. Some manufacturers are reported behind in deliveries. Open market prices are generally withdrawn, leading sellers report, but the prices quoted below give a fair idea of the situation, as they are the last paid prices on the respective varieties.

HOSE AND BELTING FABRICS

There is a continued strong demand for hose and belting fabrics reported in the local market. Hose and belting ducks are strongly held on spot, with manufacturers and dealers having but little to offer. Single filling ducks are held at 34 and 36 cents per yard, with double filling at 37½ to 40 cents per yard. Hose and belting ducks bring 73 to 76 cents per pound.

while enameling ducks are held at 88 cents and up per pound, according to width.

DRILLS, SHEETINGS AND OSNABURGS

The spot situation in the market for drills and sheetings has shown a temporary easing off, second hands shading market prices to some extent to speed up business, demand having fallen off somewhat. Prices are being reduced from ¼ to 1 cent per yard on spot offerings, according to seller. Mills, however, continue to hold firm at list prices. Demand for cotton goods exceeds supplies, the millmen state, and promises to continue on this basis for some time to come. English producers of cotton goods are sold up for many months ahead, exporting a good portion of their output to the Far East.

BURLAPS

A fair routine demand for spot burlaps is reported, and the market holds steady. Demand is reported to be chiefly for the heavier grades, while the lighter grades are selling in a smaller way.

TIRE FABRICS

17¼-ounce Sea Island, combed, sq. yd.	2.25	@	2.30
17¼-ounce Egyptian, combed	2.00	@	2.10
17¼-ounce Egyptian, carded	1.80	@	—
17¼-ounce Peelers, carded	1.25	@	—
17¼-ounce Peelers, combed	2.25	@	—

DUCKS

Belting (pound basis) lb.	.73	@	.76
Hose (pound basis)	.73	@	.76
Enameling	.88	@	..
Shoe Ducks	.84	@	.94
Single filing yd.	.34	@	.36
Double filing	.37½	@	.40

DRILLS

37-inch 2.35-yard yd.	.34	@	.34½
37-inch 2.75-yard	.31	@	....
37-inch 3.00-yard	.30	@	....
37-inch 3.25-yard	.28	@	....
37-inch 3.50-yard	.26	@	....
37-inch 3.95-yard	.24	@	....
37-inch 2.00-yard Southern	Nominal		
37-inch 2.00-yard Northern	Nominal		
40-inch 2.40-yard Southern	Nominal		
40-inch 2.40-yard Northern	Nominal		
52-inch 1.90-yard Southern	Nominal		
52-inch 1.90-yard Northern	Nominal		

SHEETINGS

40-inch 2.35-yard yd.	....	@	.....
40-inch 2.50-yard	.34	@	.36
40-inch 2.85-yard	.31½	@	.33
40-inch 3.00-yard	....	@	....
40-inch 3.25-yard	....	@	....
40-inch 3.75-yard	.26	@	.27
40-inch 3.60-yard	.28	@	.30
40-inch 4.25-yard	.24	@	.26

***Note.*—In view of the unsettled conditions prevailing in the market at the present time, the prices quoted above are more or less nominal, and are not guaranteed.**

BURLAPS

(Carload lots)

		Cents Per Yard		
7 -ounce 40-inch	....	@	....
7½-ounce 40-inch	....	@	....
7½-ounce 45-inch	....	@	....
8 -ounce 36-inch	....	@	....
8 -ounce 40-inch	12.00	@	....
8½-ounce 40-inch	12.25	@	....
10 -ounce 36-inch	....	@	....
10 -ounce 40-inch	17.00	@	....
10 -ounce 45-inch	Nominal		
10½-ounce 40-inch	17.50	@	....

Chemicals and Compounding Materials

NEW YORK, February 7, 1920.

It appears that the market can move only one way—up—these days, and it has been running true to form during the past fortnight. The undertone is bullish on all lines, and thus far there are no indications that the peak of prices has been reached. Imported goods are showing the greatest advances, labor unrest abroad contributing mainly to these increased costs.

Producers of many lines of chemicals and compounding materials are booked up to capacity on their output, and are not seeking any new business. Consumers, on the other hand, want these products so much that price advances from time to time fail to make any material impression on the demand. Producers contend that raw materials are going higher for them, and explain that they must pass these advances along.

Leads are generally quoted higher throughout the market, with a shortage ruling. Compounding materials in general have shared in this advance.

EXPORT TRADE SLOW

Export buying remains quiet, the depressed condition of the exchange markets serving effectively as a bar to American exports. This situation is working to the advantage of the American consumer of chemicals and compounding materials in at least one way—it prevents much higher prices in that were the exchange bars to be removed the foreign demand would swamp the American market and stampede prices. South America is taking some small quantities of goods at the present time.

BENZOL IS LOWER

Benzol is quoted somewhat easier, owing to freer offerings by producers. Small lots for prompt shipment are reported available at as low as 27 cents, and the market is quoted at a range of 27@30 per gallon. Producers are giving their regular domestic business first call in most instances, and are taking care of the heavy export demand in a small way. Benzol has found considerable favor abroad as a motor fuel.

LITHARGE BULLISH

A bullish tone predominates in the market for litharge, and the market is a trifle firmer for powdered in casks, being quoted at 11¾@12¼ cents per pound. Increased pig lead costs, and rising labor costs forced the increase, producers state. Export demand has fallen off, but domestic orders exceed the capacity of producers.

LITHOPONE STRONG

A strong tone rules in the market for lithopone, and prices are firmly held at recent advances, with goods in barrels held at 7¼@7½ cents per pound, and in bags at 7@7½ cents per pound. Producers are booked for some months ahead, and have little or nothing to offer on the spot.

WHITING HOLDS FIRM

A shortage of whiting is reported, and producers are behind on their orders. There is a strong tone to the market, and some talk of coming price advances is heard. Small imports of chalk are given as the main reason for the shortage, while the same cause is expected to put prices up within the near future. Commercial is held at $1.40, with English cliffstone at $2.

ORANGE MINERAL SCARCE

Producers of orange mineral have fallen behind in their deliveries, and are finding themselves unable to take care of all the business offered them. The market is stronger, being held on the basis of 15¼@16¼ cents per pound. Little attention is being paid to export business due to the heavy domestic call, and export inquiries have fallen off somewhat.

BARYTES UP

Producers are booking business for barytes only on a monthly basis, at $23 and $25 per ton, f.o.b. mills. It is stated that the price will be changed the first of next month, either upward or downward, as the situation may warrant. Demand continues to exceed the supplies. Pure white barytes for immediate delivery hold at $34@$36 per ton with leading factors in the market.

GLUES UNCHANGED

The glue market has presented no change during the period under review. Manufacturers are able to take care of most of the business offered at the present time, and prices hold firmly at 35@40 cents for extra white, 30@35 cents for medium white, and 25@36 cents for cabinet.

STRONG MARKET FOR COLORS

Increasing firmness features the market for dry colors, and the market presents a nominal appearance, with prices varying somewhat from day to day, due to unsettled conditions. Sentiment is unanimously bullish, and further advances on some lines are expected. Blacks are in strong demand, producers having been put behind in deliveries through large purchases by sugar refineries. Browns are firmly held on spot, but reports from primary markets tell of sharp advances there, which will be reflected in the domestic market when present holdings are disposed of. Blues are in good demand, with a strong tone ruling. Producers of greens are behind in deliveries, and are refusing to book further business in some cases. The market is strong as quoted. In the market for reds, English vermilion is stronger at $1.50@$1.60 per pound. Demand exceeds production, and the entire market for reds shows an advancing tendency. The market for yellows is increasing in firmness and fewer instances of price cutting are reported.

ZINC OXIDE ACTIVE

An active market for zinc oxide is reported, with producers reporting constantly increasing costs, advances in cooperage being a large factor in these increases. The spelter situation also lends a bullish tone to the market. French process, red seal, is held at 9⅝@9⅞ cents per pound; green seal, 10⅝@10⅞ cents per pound; white seal, 11⅝@11⅞ cents. Leaded grades hold as follows: Commercial, lead free, 9⅛@9⅝ cents; 5 per cent lead sulphate, 8⅝@9⅛; 10 per cent lead sulphate, 8⅜@8⅞ cents; 20 per cent lead sulphate, 8⅜@8⅝ cents; and 35 per cent lead sulphate, 8⅛@8⅜ cents per pound.

OILS HIGHER

Numerous advances in oils have been reported. Naphthas have been generally advanced by refiners, motor gasoline going up 3 cents within a short period. Turpentine is strong at $2.07 per gallon on spot and commercial tar oil held at 53 cents per gallon. Corn oil and linseed oils hold steady, with rapeseed oil somewhat firmer on both crude and refined. Some talk of lower prices on vegetable oils is heard.

MISCELLANEOUS

The wax market is quoted easier throughout, heavy offerings on spot having forced prices lower in many quarters. Shellac is also a trifle easier. Leads are higher throughout the entire list, while glycerine is quoted higher. The market for spot antimony metal is also higher.

Current Prices for Chemicals, Fillers, Colors, etc.

Acetone, carlots	lb.	.13½ @	.14
smaller lots	lb.	.15 @	.16
Accelerator, in drums	lb.	.85 @	1.00
Acids, Acetic, 56%	cwt.	6.00 @	6.50
Carbolic, C. P.	lb.	.12 @	.20
Muriatic, 20 deg.	cwt.	1.75 @	2.00
Muriatic, 22 deg.	cwt.	2.50 @	2.75
Nitric, 42 deg.	cwt.	7.00 @	7.50
Nitric, 40 deg.	cwt.	6.75 @	7.25
Sulphuric, 60 deg.	ton	16.00 @	18.00
Tartaric, crystals	lb.	.69½ @	—
Aluminum Flake	ton	29.00 @	31.00
Aniline oil, bulk basis, Contract		— @	—
Imported		Nominal	
Domestic		.34 @	.36
Antimony, metal spot	lb.	.11¼ @	.11½
Oxide	lb.	.13 @	.14
Sulphuret, red	lb.	.25 @	.30
Sulphuret, golden	lb.	.30 @	.35
Sulphuret, crimson	lb.	.45 @	.50
Needle, powdered	lb.	.13 @	.14
Asbestos	ton	35.00 @	45.00
Asphaltum, Egyptian	lb.	.18 @	.30
Domestic	ton	.16 @	.40
Barium sulphate, technical		.04½ @	.05
Sulphide	lb.	.07¼ @	.07½
Barytes, prime white imported	ton	Nominal	
white, domestic	ton	.34 @	.36
off color, domestic	lb.	.21 @	.24
Southern, f.o.b. mills		23.00 @	25.00
Western, f.o.b. mills		23.00 @	25.00
Benzol, pure, bulk	gal.	.27 @	.30
Beta-naphtol, sublimed	lb.	.68 @	.70
resublimed	lb.	1.10 @	1.15
Blacks, Drop	lb.	.05½ @	.15
Ivory	lb.	.16 @	.30
Carbon, gas, cases	lb.	.12 @	.25
Lampblack R. M.	lb.	.15 @	.45
Mineral blacks	ton	35.00 @	45.00
Blues, Prussian		.80 @	.90
Soluble	lb.	.85 @	.95
Ultramarine	lb.	.15 @	.50
Browns, Umber, Turkey, burnt, powdered	lb.	.05 @	.06½
American, burnt	lb.	.02½ @	.04
Cadmium sulhide, yellow	lb.	1.75 @	1.80
Carbon bisulphide, bulk	lb.	.06 @	.07
Bisulphide	lb.	.06 @	.07
tetrachloride, drums	lb.	.11 @	.12
Caustic Soda, 76%	cwt.	4.50 @	4.60
Chalk, precipitated, extra light	lb.	.05⅝ @	.06⅝
heavy	lb.	.05 @	.06
China clay, domestic	ton	8.50 @	20.00
imported	ton	18.00 @	23.50
Fossil flour	lb	.03¾ @	.05
Gilsonite	ton	50.00 @	60.00
Glue, extra white	lb.	.35 @	.40
medium	lb.	.30 @	.40
low grade		.20 @	.25
foot stock		.13 @	.18
brown foots		.12 @	.16
common bone		.11 @	.15
Glycerine, C. P. (drums)	lb.	.27 @	.28
cans		.27 @	.29
Graphite, flake (bbl.)	lb.	.14 @	.25
powdered (bbl.)	lb.	.05 @	.10
Green, chrome, R. M.	lb.	.37 @	.60
Ground glass (fine)	lb.	.03½ @	.04
Hexamethylene	lb.	1.40 @	1.60
Infusorial earth, powd'd.	lb.	.02 @	.035
bolted	lb.	.035 @	—
Iron oxide, red, reduced grades	lb.	.13 @	.15
red, pure, bright	lb.	— @	—
Lead, red, dry (casks)	lb.	.11¾ @	.12
sublimed		— @	—
white, basic carb	lb.	.10 @	.10½
white, basic sulp	lb.	.09¼ @	.09¾
Lime flour	lb.	.01¾ @	.02
Litharge (casks)	lb.	.11¾ @	.12¼
English	lb.	— @	—
Lithopone, domestic, bbls.	lb	.07¼ @	.07½
in bags	lb.	.07 @	.07¼
Magnesia, carbonate	lb.	.17 @	.21
calcined light	lb.	.60 @	.65
Magnesite, calcined, pwd.	ton	50.00 @	65.00
Naphtha, motor gasoline, (steel bbls.)	gal.	.26½ @	—
68 @ 70 degrees (steel bbls.)	gal.	.33½ @	—
70 @ 72 degrees (steel bbls.)	gal.	.34½ @	—
73 @ 76 degrees (steel bbls.)	gal.	.35½ @	—
machine (steel bbls.)	gal.	.45½ @	—
Oil corn, crude factory	cwt.	20.56 @	—
corn, ref. (bbls.)	cwt.	23.56 @	—
linseed (bbls.)		1.80 @	—
in carloads, spot		1.77 @	—
tank cars		1.72 @	—
Oil palm, Lagos	lb.	.17½ @	.18
Niger		.16½ @	.17
pine, yellow	gal.	1.21 @	—
rapeseed, refined	gal.	1.65 @	—
rapeseed, blown	gal.	1.65 @	1.68
rosin, first rectified.	gal.	.91 @	—
second run		.94 @	—
tar (commercial)	gal.	.53 @	—
Orange mineral, Amer.	lb.	.15¼ @	.16¼
imported	lb.	— @	—
Paraphenylenediamine	lb.	2.50 @	3.00
Petrolatum, bbls., amber.	lb.	.09 @	.07
pale yellow	lb.	.07½ @	.08½
Pine tar kiln	bbl.	14.50 @	—
Pitch	bbl.	8.50 @	—
Plaster of paris	bbl.	2.00 @	3.00
Red Tuscan	lb.	.22 @	.30
red (American)	lb.	.25 @	.30
Indian (English)	lb.	.14 @	.16
Standard	lb.	— @	—
Rosin (common to good)— 280 lbs.	bbl.	19.10 @	—
Rotten stone, powdered.	lb.	.02½ @	.04½
Rubber, substitute, black.	lb.	.13 @	.17
white	lb.	.15 @	.24
brown	lb.	.20 @	.25
Shellac, fine orange	lb.	— @	—
T. N.	lb.	1.55 @	1.60
Bleached ordinary	lb.	1.40 @	1.45
Bleached bonedry	lb.	1.70 @	1.75
Silex (silica)	ton	22.00 @	40.00
Soapstone, powdered	ton	12.00 @	17.50
Starch, corn, powd.	cwt.	5.97 @	6.23
pearl		4.97 @	5.19
Jap, potato.duty pd,	lb.	.09½ @	—
Sulphur, crude	ton.	— @	—
100 pounds		— @	—
roll		3.20 @	—
commercial superfine		1.99½ @	2.10
Talc, American	ton	20.00 @	40.00
French	ton	— @	—
Toluol, pure, in drums	gal.	.28 @	.32
commercial		.30 @	.32
Tripolite earth	lb.	.01½ @	—
Turpentine, pure gum— spirit	gal.	2.07 @	—
wood		1.60 @	—
Venice, artificial	gal.	.15 @	.16
true		4.50 @	—
Vermilion, English	lb.	1.50 @	1.60
American		.25 @	.30
Wax, beeswax, crude yel.	lb.	— @	—
refined		— @	—
Bayberry		.40 @	.41
ceresin, white	lb.	.15 @	.16
yellow		.14 @	.15

* Car lots. † Less than car lots.

Scrap Rubber

NEW YORK, February 7, 1920.

The easy position of the crude rubber market is being reflected in the market for scrap and an easy undertone rules throughout. Dealers in scrap report that they have fairly large stocks accumulated but are unable to work up much interest in the buying trade.

While prices hold nominally unchanged, it is believed that stocks could be secured on a firm bid under market prices, as dealers want to move some of their accumulated stocks into consuming channels.

	Cents per Pound		
Boots and shoes	8.00	@	8.25
Arctics, trimmed	6.00	@	6.25
Arctics, untrimmed	5.00	@	....
Tires—Automobile	3.25	@	4.00
Bicycles, pneumatic	2.50	@	3.00
Mixed hose	1.00	@	1.75
Air brake	2.75	@	3.00
Inner tubes, No. 1	14.50	@	....
Inner tubes, No. 2	9.00	@	11.00
Red tubes	9.50	@	10.00

Crude Rubber

NEW YORK, February 7, 1920.

Conditions in the money market are being reflected in the market for crude rubber. The banks are tightening up in their loans, and are holding the market higher for call money. As a result of this, holders of quantities of warehoused rubber must realize on their goods at once in many instances, and this condition has created a selling pressure, which has been aided by the steady drop in sterling and other foreign exchange rates.

There is an easier tone to the market for plantation grades, and prices are generally off for the fortnight, although really being in a nominal position, varying according to seller and the condition of the finances of the holder of the stock. Buyers are not taking hold to any appreciable degree, preferring to buy in a hand to mouth fashion as they go along, rather than commit themselves while conditions remain so unsettled.

	Cents per Pound		
Para—Up-river fine	45¼	@	46
Up-river medium	44½	@	45½
Up-river coarse	34	@	....
Caucho ball	34	@	....
Islands fine	44½	@	45
Islands coarse	21	@	....
Cameta	22½	@	23½
Madeira, fine	49	@	....
Knapsack	....	@	....
Ceylon—Smoked sheets, ribbed.	50	@	50¼
Smoked sheets, plain	48	@	....
First latex pale crepe	50	@	50¼
Amber Crepe	Nominal		
Clean brown crepe	44	@	44½
Rio Nunez string	....	@	....
Palembang	14	@	....
African	33	@	....
Prime Surinam sheets	....	@	....
Centrals—Corinto prime	34	@	34½
Esmeralda, prime	34	@	34½
*Balata sheets	1.00	@	....
Guayule, wet	25	@	27
Balata, block, Panama	45	@	46

* Nominal.

Akron Stock Prices

(Special Akron Correspondence)

Ever recurring rumors of a forthcoming advance in the price of tires have given a firm tone to tire stocks on the Akron stock exchange. Rubber shares, as a result, have generally resisted the general downward trend of the past few weeks.

Goodrich common, however, has failed to develop any notable strength following the announcement by directors that these shares will go on a six per cent basis on February 16. The stock has been on a four per cent basis for years.

Weakness in Goodrich preferred is attributed to reports that the company is planning some new financing to take care of its rapidly expanding business. This financing, brokers believe, probably will take the form of notes, the total being somewhere between $10,000,000 and $15,000,000. It is understood that these notes will be run up to five years. Recent talk has been that the company planned a further issue of preferred stock, but there is no basis for such a report. In explaining the need for additional working capital, figures are quoted to show that sales have increased 160 per cent in four years.

Reports from the Miller Rubber Co. are to the effect that holders of the old preferred stock are not only depositing their stock to be exchanged for the new eight per cent preferred issue, but are also entering substantial subscriptions for additional shares, indicating a large oversubscription.

Following are Akron rubber stock quotations for February 2:

	Bid.	Asked.
Amer. R.-T., com	85	...
Amazon Rubber	98	101
Firestone, com.	190	195
do, 6 pct. pfd.	97½	98
do, 7 per cent. pfd	100	101
General com.	600	...
do, pfd.	101½	...
Goodrich, com.	78	80
do, pfd.	95	97
Goodyear, com.	380	390
do, 1st pfd	100¾	101¼
India Rubber	185	...
Kelly Springfield	135	137
Mason, com.	28	...
do, pfd.	...	80
Marathon com.	...	60
Miller, com.	190	197
do, 1st pfd.	113½	...
do, 2d pfd.	104⅛	...
Mohawk com.	345	355
Portage, com.	110	118
do, pfd.	89	90
Republic, com.	4½	5½
do, 1st pfd.	...	90
do, 2d pfd.	...	80
Rubber Products	...	135
Star Rubber, com.	350	400
do, pfd.	99	...
Swinehart, com.	...	92½
do, pfd.	89	91
Phoenix Rubber, com.	...	24
do, pfd.	...	90
Standard Tire	200	250

American Rubber Patents

ISSUED JANUARY 27, 1920

1,328,816—To William W. Brown, Arkansas City, Ark. Shock-absorbing heel.

1,328,931—To William H. Stevens, New York, N. Y. Garter.

1,329,021—To Isaac Morgan Sartain, Tracy City, Tenn. Spring tire.

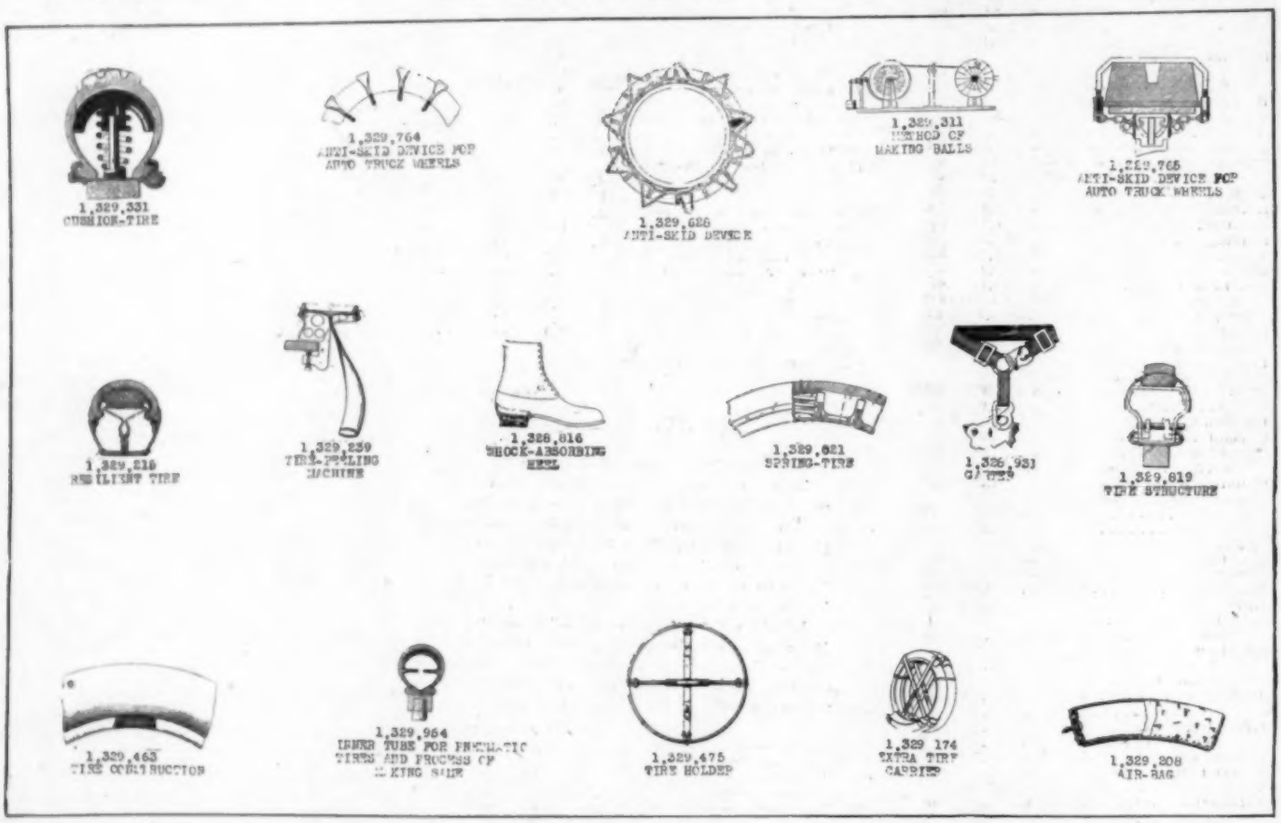
1,329,174—To Walter R. Green, Chicago, Ill. Extra tire carrier.

1,329,208—To Peter Powell, Boston, Mass., assignor one-half to James Rosenfield, Boston, Mass. Air-bag.

1,329,215—To Peter J. Westergaard, Reinbeck, Iowa. Resilient tire.

1,329,239—To Edward P. Hafner and John T. Roberts, St. Louis, Mo. Tire peeling machine.

1,329,311—To Fred Thomas Roberts, Cleveland Heights, Ohio, assignor to the Aranar Company, Cleveland, Ohio. Method of making balls.



1,329,331—To Cyrus Sylvestor Wert, Kendallville, Ind. Cushion tire.

ISSUED FEBRUARY 3, 1920

1,329,463—To Harvey F. Maranville, Akron, Ohio, assignor to the Firestone Tire and Rubber Co., Akron, Ohio. Tire construction.

1,329,475—To Lindsay C. Pritner and Lewis S. Paul, Johnstown, Pa. Tire holder.

1,329,628—To Charles Wallace Poorman, Oak Park, Ill. Anti-skid device.

1,329,764—To Leslie W. Holmes, Shelton, Conn., assignor to the Holmes Mfg. Co., Shelton, Conn. Anti-skid device for auto truck wheels.

1,329,765—To Leslie William Holmes, Shelton, Conn., assignor to Holmes Mfg. Co., Shelton, Conn. Anti-skid device for auto truck wheels.

1,329,819—To Frank E. Allen, Port Huron, Mich. Tire structure.

1,329,954—To Owen T. Bugg, Philadelphia, Pa. Inner tube for pneumatic tires and process of making same.

Hood Rubber Sales for 1919

Sales of the Hood Rubber Co., for the 1919 calendar year were approximately $25,000,000, about the same as for the 1918 year. The management anticipates that gross business for the current year will exceed $25,000,000 by a substantial amount.

National Tire Reorganization

Stockholders have approved plans of directors for a reorganization of National Tire and Rubber Co., East Palestine, O. Under the new arrangement the company's capital will consist of $1,000,000 of seven per cent preferred stock and 75,000 shares of no-par common. Half of the preferred will be issued at once and will carry a bonus of four shares of common for each ten shares. Present common shareholders will be given three shares of the new common for each share of the old common. The company was capitalized at $1,000,000, $250,000 preferred and $750,000 common.

Mason Sales Increase

The Mason Tire and Rubber Company's sales for the first quarter of the present fiscal year, which quarter ended January 31, amounted to $1,313,927.35, an increase of more than 100 per cent over the figures for the same quarter of last year which totaled $630,930.16. The Mason factory expects to show better than a 100 per cent gain on this year's business over last year. Net profit figures for this quarter are not yet complete, but show a handsome increase over profits for the same quarter of last year.

Goodyear Announces Increase

The Goodyear Tire and Rubber Company plans another big expansion to be undertaken immediately in the shape of a large factory building that will be erected at once in Akron, east of the present main factory. The present office space will be more than doubled by the erection of a large five-story office building immediately to the east of the present structure.

Conditions in Cotton Market

Following is the latest resume of cotton conditions as issued in a bulletin by A. Norden & Company, New York City, on January 29:

A month ago, predictions were numerous that January would witness a severe break in the market: result, no break of consequence and prices now about a cent higher.

A week ago sentiment here was again very bearish with many expecting a severe collapse: result, no collapse at all, and prices now about a cent higher.

And this in the face of a collection of bearish facts and rumors that in ordinary times would have quite warranted those predictions: all foreign exchanges weaker than ever, and down to new low levels: money tight and the Federal Reserve Bank making every effort to discourage speculation: rumors of depression in dry goods circles; fresh rumors every day of new wars and revolutions to break out at any moment, and finally a general feeling that the best policy from now on is to work the bear side.

The fact that the market has not only absorbed all these factors without a decline, but has actually scored and maintained a sharp advance in spite of them, seems to us to confirm the fundamental strength of the situation, practically invulnerable through the one outstanding feature, that the manufacturing world stands always ready to greedily absorb far more desirable cotton than the world contains.

And as to this last requirement, a new supply, while it is too early yet to make any predictions, there are many complaints, especially from Texas, of backwardness in preparations, and there are many assertions from all over the belt, that scarcity of labor will again be a serious factor.